

The Mining Journal

London, March 17, 1961

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The Challenge to the Metal Industries

“**M**ETAL scientists and engineers have entered an era of unprecedented creativity,” declared Mr. J. S. Smart, Jr., general sales manager of A.S.A.R.C.O., following his installation as president of the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers. Mr. Smart, who took office on February 28, laid particular emphasis on the ever accelerating rate of metallurgical progress, and predicted that results in the future would be little short of astonishing.

“Even now,” he stated, “devices are being built with stationary metal components that transform heat directly into electrical energy, or by reversing the intent, employ electrical energy to provide refrigeration. The use of solid state devices to simplify and miniaturize electronic circuitry is in its infancy. Metals and ceramics are being combined to provide cermets—new materials that are particularly useful at high temperatures. Plastic-coated steel will undoubtedly be followed by many other new combinations of metals and plastics, including such bizarre composites as a copper-plastic that would be an electrical insulator, but also a good conductor of heat”.

Progress in electronics and automatic process control, coupled with developments in such new and exciting fields of human endeavour as nuclear power and the harnessing of solar heat, supersonic flight, guided missiles and space exploration, have presented metallurgists with a challenge which has been met by the advent of an almost bewildering variety of engineering materials tailored to meet special needs. It can be said with little exaggeration that today there is no element which, in one form or another, has not been pressed into the service of mankind, and that almost every conceivable combination of metallic and non-metallic substances is being explored.

The unending quest for materials with novel or improved properties or combinations of properties has a two-fold impact on the metal and mining industries. On the one hand, it is opening up new and promising outlets for metals and minerals which a few years ago had little commercial significance. Many of these—e.g., germanium, indium and the rare earths—are recovered as by-products in the mining of other metals; hence the development of lucrative markets for them, by spreading the mining costs over a larger volume of sales, as to the profitability of the main metal or, conversely, can make a useful contribution toward lowering the limit of payability of the ore. It is noteworthy that Inco now produces as many as fourteen metals from its Sudbury ores.

Metallurgists have been outstandingly successful in meeting the demands for special-purpose materials—capable, for example, of combining a high strength-weight ratio with corrosion resistance and dependable performance at extreme temperatures. Other, and scarcely less formidable problems are presented by the impact of

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metallurgical and chemical progress on traditional markets. We have seen steel and copper challenged by aluminium, and aluminium in its turn by magnesium. The chemist, too, has not been idle, and today plastics, though as yet incapable of competing with metals in many fields of application, are making rapid inroads in a growing number of directions.

According to statistics recently published by the Wirttschaftsvereinigung NE-Metalle (West German Non-Ferrous Metals Association), production of plastics in Western Germany probably reached 1,000,000 tonnes in 1960—five times as much as in 1951, when the output of plastics in the Federal Republic amounted to 35 per cent by weight of the aggregate output of aluminium, copper, lead and zinc. In 1960 production of plastics was expected to catch up in weight with the combined outputs of these four metals. By volume production of plastics in 1951 exceeded that of the metals by 66 per cent; in 1960 it was expected to be five times that of the metals. Experts of the High Authority believe that by 1965 some 900,000 tonnes of steel, or 1.5 per cent of total annual output, will be replaced annually by plastics.

In December last year a group of Canadian motor car manufacturers was reported as predicting that the use of plastics in motor cars would jump another 20 per cent in 1961. It was stated that the average weight of plastics used per car would then be 22 lb., representing an increase of 100 per cent in the last seven years, and that the 22 lb. of plastics would replace roughly 150 lb. of metal in a compact car. Attributing the rise in the use of plastics to the switch to compact cars, the report further stated that Canadian manufacturers were using plastics throughout their cars including the engine, transmission, electrical system, body, styling and accessories.

Du Pont is reported to have spent some \$42,000,000 on the development of a plastic which, among other targets, has its sights on the motor car zinc die casting market in the U.S. This potential competitor, however, does not appear to be very seriously regarded by the zinc industry, whose product, it has been pointed out, is greatly superior to the plastic in such key properties as melting point, coefficient of thermal expansion, tensile strength, impact strength, and shear strength. At this stage, however, it would obviously be short-sighted to underrate the potentialities of a material with such powerful backing. The major advantage claimed for the new plastic which, according to a report in the *American Metal Market* last year, was to replace zinc in the instrument cluster panels of the 1961 model Chrysler Valiant, is its light weight, which is less than one-fourth that of zinc.

Now Celanese Corp. of America have announced a new high-strength plastic which, it hopes, will replace "millions of pounds of metals". The chairman of this company has estimated that the total market for these "high performance engineering plastics" will triple during the next three years, reaching a level of 100,000 s.tons by 1970. The largest immediate use for the new plastic is expected to be replacement of die-cast zinc and aluminium, as well as brass, copper and steel. The chief advantages claimed are lower cost, greater design versatility, lower weight, and no need for costly finishing and assembly procedures.

Fibreglass, having gained a firm foothold in the production of sports car bodies and also of moulded components for buses, may soon compete with aluminium in the small aircraft field. Piper Aircraft Corp. is reported to be conducting extensive research in the use of this material in both the body and wings of its aircraft.

Even the introduction of plastic coins, however improbable, can no longer be excluded, for quite a strong case for it was put forward by Mr. J. H. James, Deputy Master and Comptroller of the Royal Mint, in his annual report

to the Treasury for 1959. In favour of plastic coins it was contended that they would be easy to carry, probably durable, and could undoubtedly be produced more cheaply than the lowest face values, whereas the cost of cupronickel, brass and bronze was such that a halfpenny could only be produced at more than its face value. Moreover, plastic coins could be produced in a variety of colours for different denominations.

The growth of the plastics industry, which both quantitatively and in the variety and scope of product has been among the most notable developments of the post-war era, must inevitably lead to profound changes in the general pattern of materials usage. On the other hand, the inroads made by the newer materials, synthetic or otherwise, into the traditional markets of steel and the older non-ferrous metals might well be offset by opportunities for more intensive market development elsewhere. For instance, the increasing use of unitized bodies by the American motor car industry will provide an outlet for galvanized sheets which is expected to absorb 100,000 tons of zinc alone. This would more than offset not only any losses to plastics in the motor car market but also any falling off in the use of zinc resulting from the growing production of compacts, which last year took an average of about 30 lb. of the metal compared with 70 lb. for passenger cars of the normal American size.

Certainly the immense programmes for the expansion of steel production and the development of iron ore supplies throughout the war are an impressive demonstration of confidence in the industry's ability to hold its own. Mr. Oscar M. Miller, manager-primary of the marketing research staff of Union Carbide Metals Co., predicted recently that steel would continue to retain a paramount position among industrial materials during the next ten years. According to a study published by the United Nations Steel Committee in Geneva, world steel consumption should reach 625,000,000 tonnes in 1975 compared with some 300,000,000 tonnes in 1959 (vide *The Mining Journal*, Nov. 4, 1960, p. 492).

The development of "thin tinplate" in the United States was an impressive demonstration of steel's ability to fight back (in this case against aluminium). Moreover, steel has made important inroads into territory previously dominated by other materials, such as the manufacture of office furniture.

Competition, whether from other metals or from plastics, concrete and timber, should be viewed as a stimulus rather than a threat to producers and fabricators of metals and its long-term benefits, in the aggregate, may far outweigh any immediate setbacks in particular markets.

During 1961 the American Institute of Mining, Metallurgical and Petroleum Engineers moves into the new United Engineering Centre building now being constructed at the United Nations Plaza in New York. This 20-storey building of stainless steel curtain wall construction is eloquent testimony to the ever increasing versatility and flexibility of metals as metallurgists acquire a better understanding of their nature and designers, engineers and manufacturers become ever more cognisant of the opportunities afforded by their behaviour and special properties.

MR. ROBENS' OPTIMISM IS CATCHING

Last week, at the invitation of the Fuel and Power Group of the Parliamentary Labour Party, Mr. Alfred Robens, chairman of the National Coal Board, visited the House of Commons where he outlined his plans and answered questions put to him by members of the Group. Members representing coal mining areas were impressed by the detailed knowledge the new chairman has already

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CYANIDE ODYSSEY

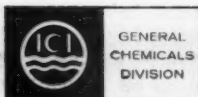
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. . . where barges took over, travelling northwards on the Athabasca River to Lake Athabasca, and through the Great Slave Lake to Yellowknife.

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gathered on the problems of the industry, the range of his plans for coping with them, and his optimistic outlook for the future of British coal mining.

In his talk Mr. Robens offered an enlightened approach to the problems of the industry. While all the members concerned did not, perhaps, share his degree of optimism, nevertheless they were left with a feeling of confidence that the chairman's plans and policy could work.

Mr. Robens calculates demand for coal at a minimum of 200,000,000 tons a year, and he forecasts that it will increase each year with the expansion of the electricity installations and their output. Other industrial expansion, he said, will naturally favour coal mining. Mr. Robens plans to wipe out the current deficit of £60,000,000 in the next few years, and aims to have the industry able to pay its way during his tenure of office.

He made it clear, however, that steady output and a ready market are fundamental to his plans for improvements in the mechanization devised to produce bigger coal together with more solid transference of coal to the pithead and subsequent distribution to industrial consumers and to wholesalers in the domestic market.

Mr. Robens has great hopes of re-establishing entry into the foreign markets held before the war, and he has little apprehension about the competition from oil. He does not see why oil should have better publicity and methods of salesmanship than coal, and plans are under way for embarking on a coal propaganda campaign unprecedented in the history of the industry. Briefly, he intends to match the oil industry's publicity operations.

Mr. Robens does not share some of the apprehensions voiced by members as to the future manpower position in coal mining. During the course of the discussion with members, far from treading on the toes of the trade unions, he welcomed their continued co-operation and indicated that he was completely in favour of raising the wages of the miner for increased output resulting from improved mechanization. The prospects of producing bigger and cleaner coal were, in his view, never better.

The Fuel and Power Committee of the Conservative Party will be shortly having a similar meeting with Mr. Robens.

PRACTICAL AID FOR GOLD MINERS

Although the Australian gold mining industry has undoubtedly benefited from total tax exemption on income and subsidization, the fact remains that only a limited number of marginal producers qualify for varying rates of subsidy up to £2 15s. an oz. Now, in the face of the rising trend of costs, particularly wages, there are indications that even taking into account tax exemption this rate of subsidization is insufficient to maintain some of the mines in profitable operation. Even those mines whose overall level of profitability precludes them from receiving government aid are worried about their marginal ores being eliminated from their reserves within a year or so if costs rise sharply. It is likely that a fresh approach may be made by mining companies for a greater measure of assistance (see *The Mining Journal*, Dec. 16, p. 681).

The State of Western Australia in the meantime has made a new and commendable move in this direction. For many years the small producer has been helped by facilities for the crushing of his ore at the government bat-

teries, by cartage rebates and by assaying. The latest measure of assistance is the hire to prospectors and small operators of portable air compressors equipped with jack-hammer, air leg, hoses, and an air hoist. This equipment is now available at Kalgoorlie, Mount Magnet and Marble Bar.

It is likely that requests will be made for an extension of this valuable service; compressors, for instance, may soon be loanable from Meekatharra and Coolgardie. Increased activity by small producers could result in an important addition to the State's total output but, while a number of rich returns has been reported recently, there has been nothing with promise of development to the company standard.

ACTION SPEAKS LOUDER THAN WORDS

While Britain claims to be a special repository of wisdom on international affairs and other countries have always been glad of our counsel it would be more to the point if we were able to prove ourselves more successful and more able to help them financially, says Mr. J. K. Michie, chairman of National and Grindlays Bank. "We must either have more money to lend abroad, to lend to our Commonwealth friends and particularly to emerging nations or see our influence and our trade steadily wane." (see p. 320).

Filling in the gaps in finance needed for developing countries is not a one-sided operation, and these countries must look to their own resources. Mr. Michie, in company with Mr. Vincent Grantham, chairman of The Chartered Bank, whose statement to shareholders was published in our last week's issue, both point out that the success, for example, of India's third five-year plan depends to some extent on how far hidden cash balances in India can be drawn into the banking system and how far gold can be winkled out of private hoards, although it is probably more pertinent to ask how far the future hoarding of gold can be prevented by making savings more popular and curtailing the supply of money.

For the same reasons an expansion of bank deposits in Pakistan is at least as urgent as in India and, says Mr. Michie, the ratio of deposits to population in Pakistan is somewhat lower than in India, which seems partly to be due to the traditional Muslim objection to accepting interest.

Mr. Grantham evinces some surprise that with India's future development so dependent upon foreign exchange earnings there should be "increased interference by officialdom in commercial trading, particularly as experienced government servants are so badly needed in the ordinary administrative duties for which their training suits them".

Although Britain along with the U.S. and other highly industrial countries is launching on an export drive overseas, reports to the Chartered Bank indicate that the renewed awareness of the necessity to export is not so far being translated into efforts to find new markets. One common complaint made by officials and businessmen in a number of Eastern countries is that Britain, in marked contrast to Germany and Japan, shows little interest in their markets. As Mr. Grantham points out there is undoubtedly some truth in this for it seems either that good and usual exporters have already sufficient buyers for their products and cannot devote the time to smaller and less known markets, or there is an instinctive feeling that too much risk is involved.

Major Precambrian Boundaries

ESTABLISHING the age of rocks by radioactive methods has been employed, especially in Precambrian areas, on an increasing scale over the past few years in many parts of the world. Possibly the greatest concentration of such "age sampling" over a large area (although still quite widely spaced) is that on the Canadian Shield, including the southern edge that extends into the United States. As results of this sampling are plotted, a pattern of different-aged structural "provinces" emerges showing significant relationships to certain ore deposits.

Radioactive Dating

Radioactive dating depends on the known rate of decay of certain isotopes of uranium, thorium, potassium or rubidium, and the measurement of these and their decay products. In addition to the physical problems of measuring the proportions of "parent" and "daughter" isotopes, problems of a geological nature arise, e.g., are we measuring the date of the original crystallization of a rock such as a pegmatite, that of recrystallization during metamorphism, that of the original deposition of a vein mineral or its later re-distribution, or the original age of a mineral crystal deposited as a sand grain in a later sediment? In a general way, however, the date we are most likely to determine is that of the last period of folding, intrusion and metamorphism, affecting the area in question. A method now used extensively by the Geological Survey of Canada, that of measuring the ratio of isotopes of potas-

sium and its "daughter" argon in mica crystals, almost certainly gives the age of the last disturbance and thus is particularly useful in giving the relative ages of different structural, or tectonic, "provinces".

The pattern emerging on the Canadian Shield (as has been shown in papers by J. T. Wilson, J. E. Gill and others) is that of two nuclei or cores (a small one in the Yellowknife area and a large one in the Keewatin or Superior area) around which have been added, by deposition of sedimentary and volcanic material followed by mountain-building, tectonic provinces of several later ages. Fold axes, and hence prevailing dips, in these younger marginal "provinces" are characteristically inclined away from the older nuclei. The two continental nuclei generally show 2,300,000,000 to 2,700,000,000 years as the age of their last major disturbance and are classed as Archaean. The marginal Precambrian areas show several periods of disturbance (mountain-building, intrusion and metamorphism) that occurred between 1,900,000,000 and 800,000,000 years ago and which may be conveniently included under the term "Proterozoic", used in the sense of all Precambrian rocks deposited, or involved in orogenies, less than 2,000,000,000 years ago.

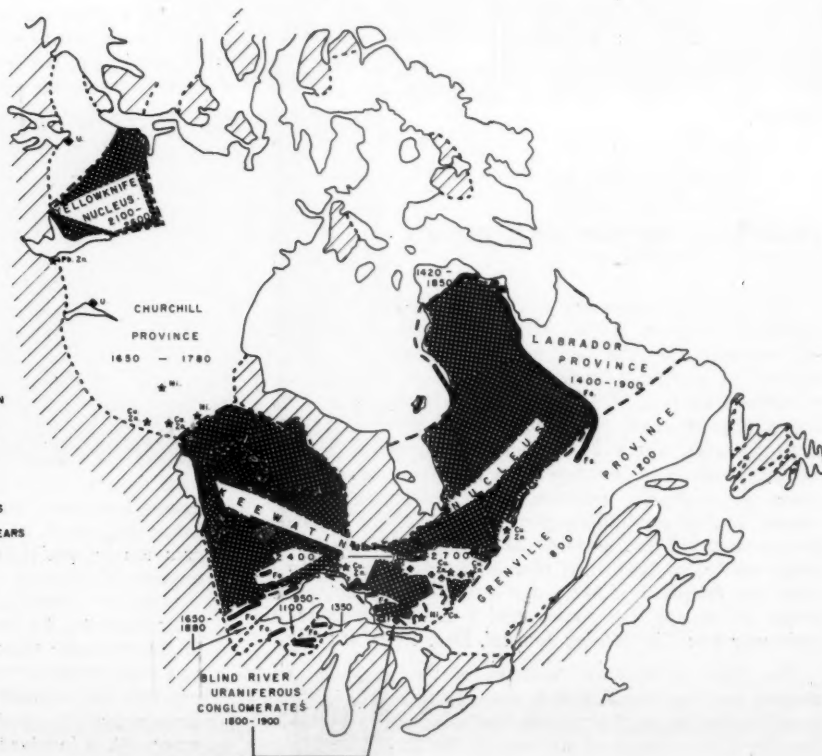
A Crucial Age Boundary

From the economic standpoint particular significance is attached to the boundaries between the old Archaean nuclei and later marginal areas classed as Proterozoic. The most obvious and direct relationship of mineral deposits of commercial interest to such age boundaries is

MAJOR MINERAL AREAS IN RELATION TO ARCHAEAN-PROTEROZOIC BOUNDARIES OF THE CANADIAN SHIELD

- PROTEROZOIC IRON FORMATION
Fe — PRODUCING AREAS
- ★ Ni Cu MAJOR AREAS OF ACTUAL OR
POTENTIAL BASE METAL PRODUCTION
- ▲ MAJOR AREA OF SILVER-COBALT PRODUCTION
- ◆ MAJOR AREAS OF GOLD PRODUCTION
(THESE SHOW NO PARTICULAR RELATIONSHIP
TO ARCHAEAN BOUNDARIES)
- ARCHAEAN NUCLEUS AREAS
- YOUNGER PRECAMBRIAN (PROTEROZOIC) AREAS
- APPROXIMATE AGES GIVEN IN MILLIONS OF YEARS
- ▨ PALAEOZOIC, AND LATER COVERING

200 100 0 100 200 300 400 500
SCALE IN MILES



esand Ore Deposits — I

that of Banded Iron Formations, and their contained higher-grade concentrations of iron ore and sometimes also manganese. Banded iron formation at or near the base of the Proterozoic sediments is found on a large proportion of the exposed boundary of these rocks with the Archaean nucleus that is alternatively named the "Kewatin" or "Superior" tectonic province. It can be traced, with few gaps, from the islands on the east side of Hudsons Bay across the north part of the Ungava peninsula and down the western edge of the Labrador so-called "trough" to its meeting with Grenville folding (see map). It can still be traced, although discontinuous due to close folding and faulting, southwesterly for 200 miles just inside the Grenville "front", and again outside it in relatively undisturbed sediments near Lake Mistassini (53 deg. N. 74 deg. W.). Within this length of 1,600 miles the only area where "direct shipping" iron ore concentrations have been found is in the vicinity of Schefferville, the centre of substantial production. It is most probable that many other such concentrations once existed but were removed by Pleistocene glaciation or earlier erosion.

South-west of Lake Mistassini only erratic signs of altered iron formation have been mapped in the Grenville gneisses to the point where they are covered by the waters of Lake Huron and by sediments of post-Cambrian age. South and west of Lake Superior, where Precambrian rocks are again exposed, the great iron ranges of Michigan to Minnesota occur near the base of the Animikie sediments of the same approximate age, and bearing the same relationship to the Archaean basement, as the Proterozoic in Quebec and Labrador.

In 1959 no less than 75 per cent of the total iron production of North America (including direct shipping ore and concentrates) came from the iron formations near the base of the Proterozoic (alias Algonkian).

Blind River and Witwatersrand Uranium

A second type of ore deposit bearing a direct relationship to the same boundary is that of uranium-bearing conglomerates. Of the uranium production of the Western World in 1960 about 36 per cent was derived from the conglomerate-type ores at the base of the Proterozoic at Blind River and Witwatersrand. Such deposits of commercial grade are found in North America in only one area, at Blind River, Ontario, and are there at, or very close to, the base of the Proterozoic sediments, i.e. in a similar stratigraphic position to the iron formation described above. Radioactive conglomerates of similar type, but with sub-commercial content of uranium, are found at other points along the same major age boundary. Going further afield it may be noted that the Witwatersrand gold and uranium-bearing Banket conglomerates, although distributed through a much greater vertical range, lie within Precambrian sediments of the same general age as do those of Blind River, again near their lower contact with an ancient nucleus. The beds having the closest resemblance to the Blind River Conglomerates are the Dominion Reefs, nearest the base of the series and giving an age of about 2,000,000,000 years while the underlying Archaean basement is dated at about 3,000,000,000 years. Conglomerates of very similar character and carrying gold and some uranium are also found at Jacobina, in the State of Bahia, Brazil and show the same relationship to the Archaean basement there.

In this and a subsequent issue we reproduce extracts from Mr. Duncan R. Derry's presidential address to the Society of Economic Geologists at their Annual Meeting in Denver last October. The full text of the address will appear in a forthcoming issue of "Economic Geology". The extracts given here relate the Canadian Shield to the pattern of ore deposits in that area, while a second article will examine some similarities in the Precambrian areas of other continents. Mr. Derry, who is now consulting privately, was until recently vice-president (exploration) of the Rio Tinto Mining Company of Canada Ltd.

Sulphide Deposits

In addition to the direct relationship of iron formation and some uraniferous beds to the base of the Proterozoic in North America, some major non-ferrous, base metal-producing areas on the Canadian Shield appear, as may be seen on the accompanying map, to show a concentration in a zone within 100 miles or so of the same boundary between the continental nucleus and the younger marginal tectonic provinces. They are not, however, distributed evenly along this boundary but lie relatively near those parts of the boundary that are formed by a fault zone, or a sharp limit to a folded system, i.e. to a tectonic rather than an erosional boundary. The copper-producing area of Chibougamau, the copper-zinc and gold of Val D'Or, the copper-gold area of Noranda, the silver-cobalt deposits of Cobalt, and the nickel-copper deposits of Sudbury all lie within 100 miles of the "Grenville Front" that forms the sharp tectonic boundary between the Archaean and the Proterozoic in this part of the Shield.

In Manitoba the nickel deposits of Thompson Lake, the worked-out copper-zinc mine at Sherridon and the copper-zinc bodies of Flin Flon all lie within 100 miles or so of the boundary (believed to be a fault zone) that divides the Archaean nucleus on the south-east from the younger "Churchill Province" on the north-west. Much more evidence would be required, not only in Canada but in comparable areas in other parts of the world, before reliable conclusions could be drawn on the significance of this distribution. Obviously the tectonic boundary between Archaean and Proterozoic alone is not an ore-maker since long stretches of it have shown no significant sulphide mineralization. It seems possible, however, that the coincidence of (a) deeply penetrating faults that form structural boundaries between areas of different aged orogenies and (b) predominantly volcanic belts within the tectonic provinces on one side or the other of such boundaries, may provide particularly favourable conditions, in a regional sense, for sulphide base-metal deposits.

As has been noted by various authors gold mineralization appears to be typical of the narrow volcanic belts throughout an Archaean nucleus, and the orebodies were probably formed in Archaean time and bear no special relationship to the outer boundaries of the nucleus.

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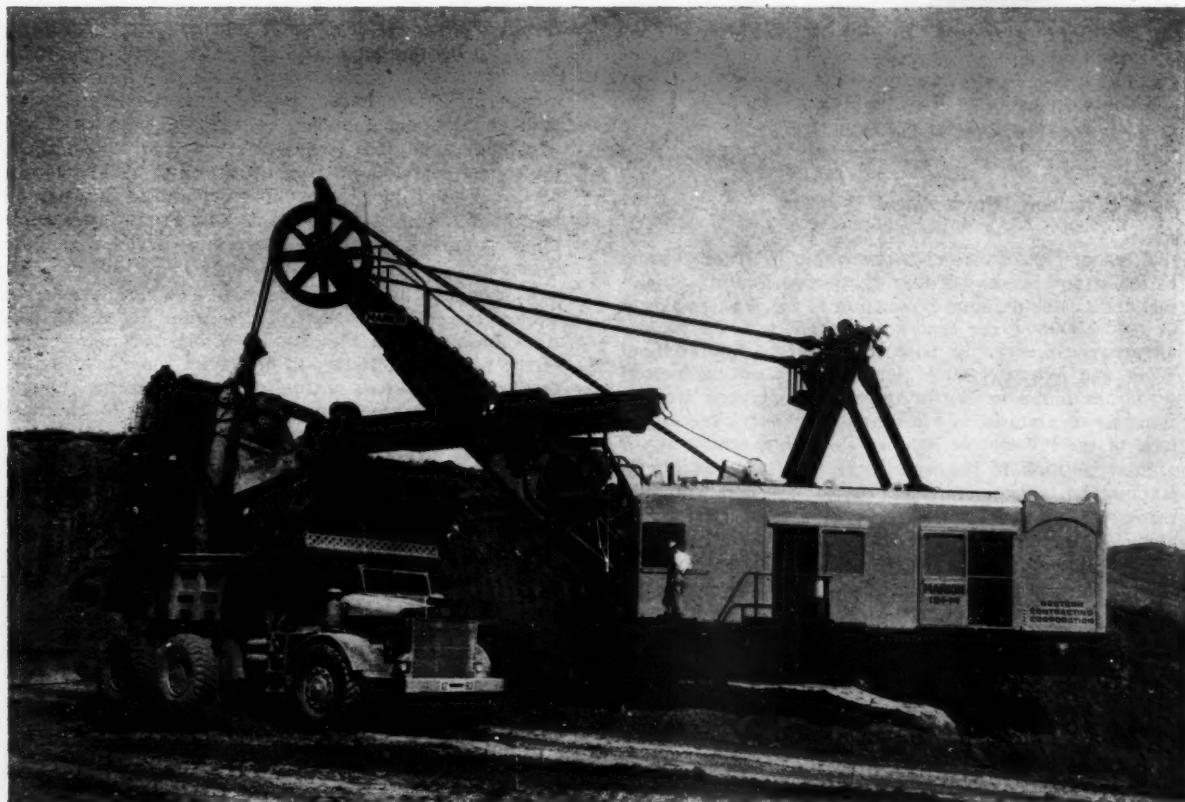
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Automatic Control System for Mining

A NEW fully automatic control system for the mining industry has been developed by The English Electric Co. Ltd. The system has been designed for handling material at the surface; removing mine cars from a cage, emptying and returning them completely automatically.

For the control and sequencing of all operations transistorized logical elements and contactless sensing devices from the UNISTAT range of static equipment are used. Having no moving parts, they ensure practically maintenance-free operation and are more reliable than conventional relays and auxiliary contacts. When maintenance is necessary standard units can easily be replaced. From them, too, systems of any size and complexity can be built. The complete control system is also more compact.

A model mine car circuit controlled by full-size equipment with the exception of miniature proximity sensing devices is being demonstrated at the A.S.E.E. Exhibition (see page 305). A typical circuit consists of a tower mounted friction winder with balanced two deck cages (each cage holding one mine car), fulls and empties, traversers, tippler and rams.

When a full mine car has been wound to the surface it is rammed out of the cage by a ram which pushes forward an empty mine car. As the cage descends with the

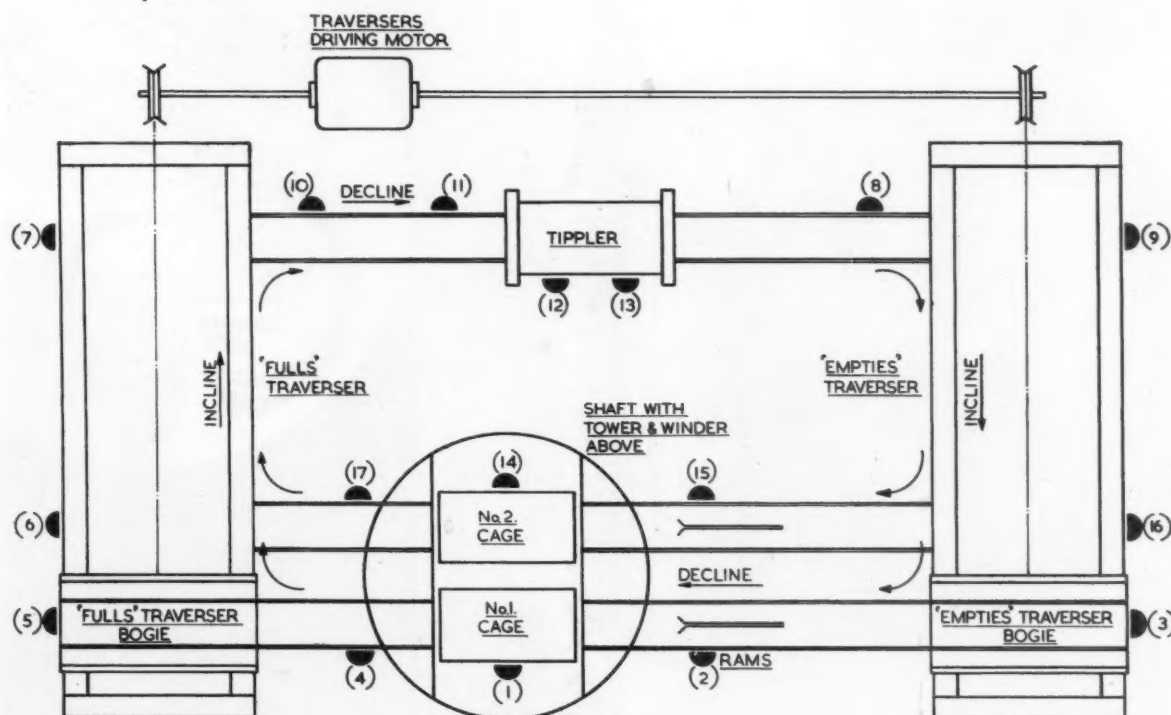
empty car, the full car gravitates on to a traverser trolley. This is driven up a slight incline so that the car can gravitate off the trolley and into the tippler.

The tippler turns the car through 360 deg., emptying its contents on to a conveyor belt or hopper underneath. The car, now empty, gravitates on to the trolley of the empties traverser, is again driven up a slight incline to a point directly opposite the cage it has to enter, gravitates off and is rammed. This completes the circuit.

The sequence of operation just described follows one car but there are, of course several cars in the circuit at one time. A car must, therefore, complete an operation in a section of the circuit before another can enter that section. For reliable interlocking the positions of the mine car are detected by proximity heads. These contactless sensing devices detect the presence of a ferrous material within their operating zone.

The signal produced by the head is then fed into the UNISTAT transistorized logical elements and these elements are responsible for the sequencing and control. The output from the logic is then amplified further and this signal is used to operate the motor starter or solenoid or contactor as necessary.

The illustration below shows the layout of a typical mine car circuit.



PROXIMITY HEADS

- (1) No. 1. CAGE IN LINE
- (2) CAR ON No. 1. RAM
- (3) BOGIE IN LINE WITH No. 1. TRACK
- (4) CAR CLEAR OF No. 1. CAGE
- (5) CAR FROM No. 1. CAGE ON BOGIE

- (6) CAR FROM No. 2 CAGE ON BOGIE
- (7) BOGIE IN LINE WITH TIPPLER
- (8) CAR ON ARRESTER
- (9) CAR ON BOGIE
- (10) CAR CLEAR OF BOGIE
- (11) CAR IN TIPPLER

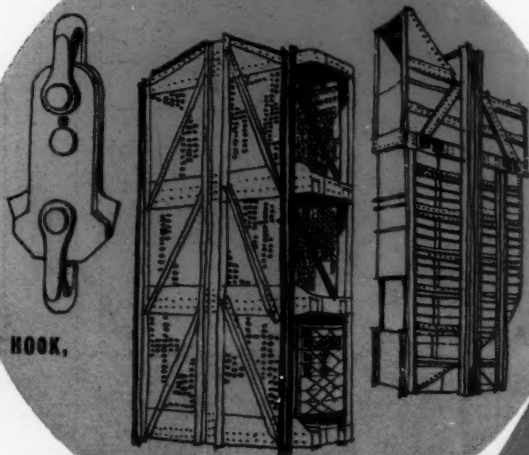
- (12) TIPPLER IN LINE
- (13) TIPPLER PARTIALLY ROTATED
- (14) No. 2. CAGE IN LINE
- (15) CAR ON No. 2. RAM
- (16) BOGIE IN LINE WITH No. 2 TRACK
- (17) CAR CLEAR OF No. 2. CAGE

Winning and Processing Ores with

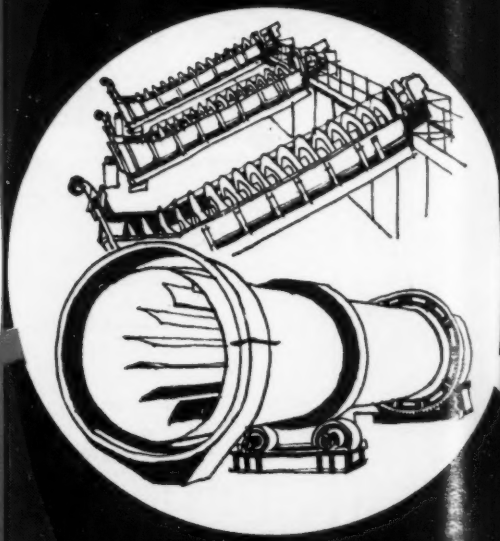
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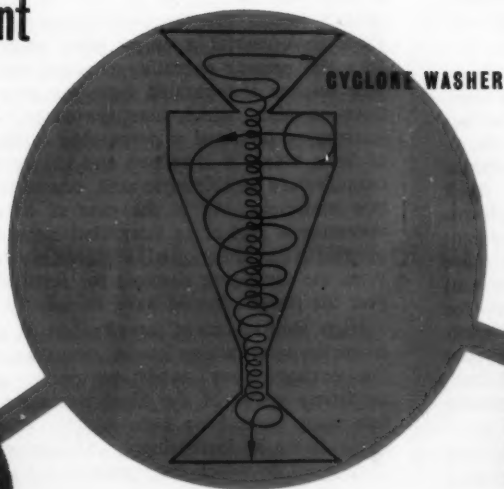
HUMBLE SAFETY HOOK,
CAGE, and SKIP



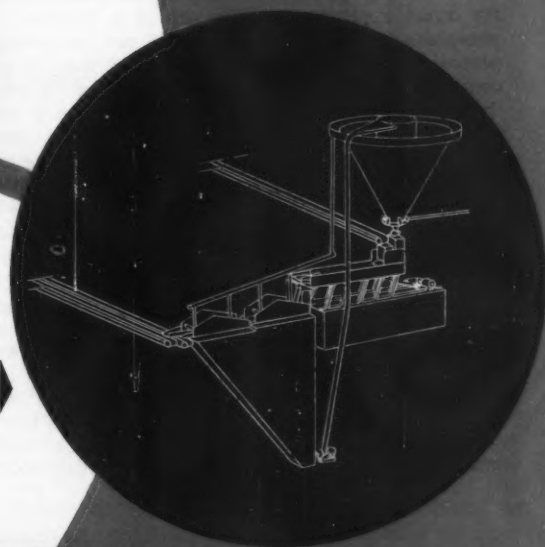
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Egypt's Mining and Mineral Resources—II

Egyptian Mineral Production

THE discovery of phosphates in Algeria in 1873 led to an examination of strata of similar geological age in Egypt, and as a belated result deposits of phosphate of similar type were, in fact, discovered by the Geological Survey in 1898. The first mining leases were not, however, taken until 1911. Phosphate is now known to be widespread in the upper cretaceous sediments of Upper Egypt, but the areas best known and actively exploited are Safaga and Kosseir on the Red Sea and Sebaiya in the Nile Valley. This restriction is due to the relative accessibility of these deposits to transport facilities, but even these areas are not ideally placed for competition with the North African phosphate. Suez Canal dues made it difficult for Safaga and Kosseir to ship to Europe at competitive prices, and high railway freights to Alexandria likewise deterred the Nile valley producers. As Europe was the only foreign market for the latter, a rebate of railway freights was eventually conceded. The Red Sea producers developed the Far Eastern market, but in 1954 the government promulgated a law entitling them to a refund of Canal dues on tonnage shipped northwards provided this represented an increase in overall production as compared with the average for the years 1951-3.

Although production has reached the annual rate of 600,000 tons, in the last year or two it has experienced some recession from which it now shows signs of recovering. It is marketed partly as rock phosphate for the manufacture of superphosphate and partly as ground phosphate for direct application to the soil as a fertilizer. Rock phosphate is sold on the basis of 29 per cent phosphorus pentoxide (64 per cent T.C.P.), not more than 2½ per cent combined ferric oxide and alumina ("Feral"), not more than 4 per cent fluorine, and not more than 4 per cent moisture, with penalties and bonuses. The basis for ground phosphate is rather different, grade being not less than 63 per cent T.C.P., not more than 2½ per cent moisture, 70 per cent of the material to pass a 200 mesh sieve. There is, however, a tendency to put less emphasis on fineness and more on citric acid solubility.

Egyptian capacity for the manufacture of superphosphate is of the order of 180,000 tons a year, but present internal requirements are about 250,000 tons a year and are expected to double within five years. This augurs well for the prosperity of the phosphate mines so far as internal markets are concerned, but in the export trade they are faced with the fact that the Egyptian product is low grade (64 per cent T.C.P.) as compared with the Jordanian (70-72 per cent T.C.P. natural) and the Israeli (68-70 per

The article appearing herewith is the concluding instalment of two describing the mining industry and the mineral resources of Egypt. The article discusses the non-metallics mining industry of the country

cent T.C.P. after beneficiation). Both these countries also have direct access to the Red Sea and so escape Canal dues when competing in Egypt's Far Eastern markets. Egypt's survival there must accordingly depend on her ability to produce high grade material at low cost. Among the proposals made for achieving this object are the development of new mines, mechanization, and beneficiation. Beneficiation is, in fact, already being practised to some extent and with success.

Sulphur—Alumina—Gypsum—Talc

Elemental sulphur associated with aragonite and gypsum is being mined by the Société Egyptienne d'Engrais et d'Industries Chimiques at Ras Gamsa, on the Red Sea coast. It was first discovered here in 1865 and two or three unsuccessful attempts were made to exploit it before the present operating concern took it over in 1953. The sulphur is separated from the associated gangue in a flotation plant which uses sea-water. The sulphur concentrate so obtained is despatched to the company's works at Suez, where it is refined and subsequently used for the manufacture of sulphuric acid, one of the company's basic raw materials. As in the case of iron ore, this mining operation is part of an integrated industry and none of the product is either exported or placed on the domestic market. With the increasing demand for fertilizers in Egypt, however the project should have an assured future.

High alumina clays, usually but in all probability incorrectly described as kaolin, occur at several horizons in the carboniferous sandstone series and the Nubian sandstone series of the Sinai peninsula. Within the last few years these have been actively exploited and appear likely to be so increasingly. The mines are close to the Suez coast, to which their product is transported by trucks.

By

G. A. Schnellmann,

Ph.D.(Lond), A.R.S.M., M.I.M.M.

Mineral Production Statistics
(in tonnes except where otherwise stated)

	1954	1955	1956	1957	1958	1959
Phosphate	534,691	625,679	615,002	585,498	558,098	628,991
Manganese ore (ordinary)	171,188	214,183	195,785	76,165	67,408	66,585
" .. (high grade)	6,232	5,804	4,615	9,358	44,207	61,070
Gold (ozs.)	17,388	6,526	7,679	3,526	1,812	2,486
Talc	2,520	6,002	6,992	5,470	6,580	6,085
Black sands	6,715	7,190	7,562	6,970	6,611	8,921
Lead concentrates	410	479	450	941	742	334
Kaolin	845	2,694	2,199	4,797	9,111	11,222
Wolfram	4	1,765				
Tin (cassiterite)	8					
Chromite	530	840	225	103		
Zinc concentrates	596	1,798	1,751	35	1,501	100
Sulphur		615	101		7,241	6,109
Ilmenite	225		500	175		
Iron ore			130,620	254,100	178,464	246,145
Asbestos				20	440	455

The clay is sold on the basis of minimum 46 per cent alumina and supplies both an internal and an export market. Annual output at present is of the order of 100,000 tons.

Several beds of gypsum occur in the miocene series, some of them conveniently situated on the Suez coast of Sinai, where they are mined opencast at Ras Malab. Part of the output is consumed in the country and part exported. It is understood that an expansion of the industry to an output of 150,000 tons a year is planned.

Deposits of talc in the south-eastern desert were worked by the ancient Egyptians and then forgotten until they were rediscovered in 1932. They are associated with chlorite schists and serpentine, which have a limited distribution. Other localities are known in the Nile valley but are not so important as those near the Red Sea. The product is of a high grade, but the usual problems of water and transport have resulted in a high production cost, and Indian talc has become a serious competitor.

Besides the deposits being worked, other occurrences of all the minerals listed above are known, and with the increasing speed of industrialization it is expected that some of them will be developed in the near future. In addition to these minerals, Egypt possesses resources of others which have yet to be assessed.

Egypt's Unassessed Potential

Among the ferro-alloys, tungsten ores were first discovered in 1930 and other occurrences were discovered during the Second World War, by Selection Trust Ltd. acting on behalf of the British Government. Five localities have been recorded, of which two have been thought likely to reach the production phase, but little development work has in fact been done.

Chromite is known to occur and was mined during the war and immediate post-war years at the rate of about 600 tons a year. The producing mines are reported to have maintained a grade of over 46 per cent Cr_2O_3 without beneficiation.

Molybdenite has been reported from two localities and some exploration has been carried out.

Nickel, in the form of garnierite, is known to exist on St. John's Island but has not been examined.

A discovery of cassiterite in 1934 was followed by others in 1940 and 1942. The primary ores are either quartz veins or pegmatites, neither of which has so far proved to be payable, but the eluvials and alluvials derived from them are said to be of economic grade.

Graphite is known to occur as graphitic schists in the Barramia area of the Eastern Desert, where it was discovered in 1938.

Asbestos has been reported at several localities in the Eastern Desert.

Bentonite occurs near Fayum. Fuller's Earth is also found in that area, and in the vicinity of the Hurghada oilfield on the Red Sea coast.

Cement materials, building stone, and building sand are abundant, but glass sand is so far only known to occur in two localities, one in Sinai and the other on the Red Sea coast.

There is considerable interest at present in the possibility of the existence of coal in Egypt, and exploration has met with a limited amount of success. It is too soon to pronounce on the viability of the discoveries, but it is not unreasonable to suppose that any coalfields of major importance would have been discovered during the primary geological survey of the country.

Recent Developments in Australian Mining

THE Department of Mines in New South Wales, is to start drilling in the locality of Griffith, in the south-west of the State, to test brown coal deposits. Preliminary work will involve about 3,000 ft. of drilling. Seams up to 100 ft. thick are known and the coal is said to compare very favourably with the Victorian brown coal. Pipe clays are associated with the coal seam, and these will also be investigated. If a workable body of coal is proved, the situation of the deposit, in what is essentially a pastoral and agricultural region, will necessitate a very careful enquiry into its economic possibilities.

The great expansion of the New South Wales black coal industry and the growth of a valuable export trade resulting from it, has brought under strong criticism the lack of adequate shipping facilities at the export ports, which have not kept pace with the development of the collieries. Moreover, these ports are at a disadvantage when loading the large ships being put into the coal export trade. These modern coal carriers have capacities of 30,000 and 40,000 tons, and if port facilities cannot cope with such vessels, contracts will be lost to Australia, and go to Canada and the United States.

It is generally contended that the ports of Sydney, Newcastle and Port Kembla must be modernized to these standards by increasing the depth of water at the coal berths, and by the provision of equipment that can load at the rate of 3,000 to 4,000 tons of coal per hour. Plans are in hand for the construction of a loader with a capacity of 2,000 tons per hour, at a cost of £A3,000,000. The rapid expansion of the industry, and its increasing value, has stressed the urgency of the case, and it appears that there

will be rapid development in this essential adjunct to the country's coal mining industry. Furthermore the coal mining industry is anxious to obtain some protection from the competition of oil, which is making inroads into the use of coal in certain industries.

Activity at Mount Isa

The new Mount Isa power station at Mica Creek is the first outdoor station to be built in the Southern Hemisphere and was opened in January. It is also the largest power station to be built in Australia by private enterprise. Decision to build this type of plant was based on the suitability of the climate and the capital saving resulting from the design. It contains two Babcock and Wilcox pulverized fuel boilers with continuous rating of 260,000 p.p.h. at 1,050 p.s.i., and two 30 MW. turbo alternators of outdoor type; coal is obtained from the Collinsville field where the company has a recently developed and highly mechanized colliery.

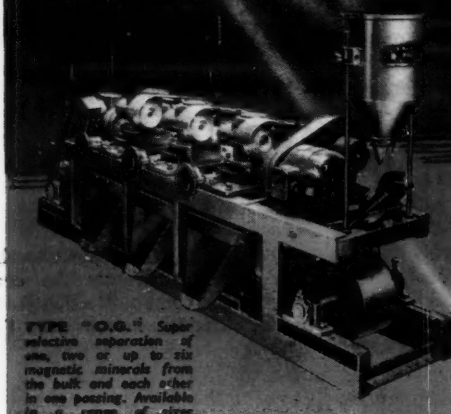
A new ore hoisting, man and supply shaft is being sunk to a depth of 3,250 ft. It will be circular in section and 24 ft. dia. Equipment will include a double deck cage of 160 man capacity, and a small double deck cage of 36 man capacity. Ore will be hoisted by two skips in balance, raising 19,000 tons of ore per day; skip capacity is 24 tons. Cost of the shaft, complete with equipment, is stated at £A5,000,000, and the work is planned for completion in 1964. Both lead and copper sections of the mine will be served. The largest exhaust fan system in Australia has just been completed.

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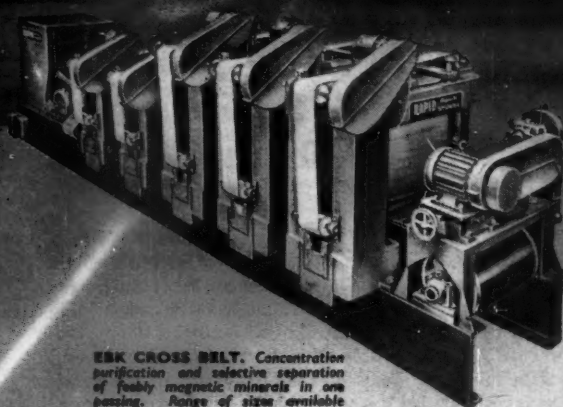
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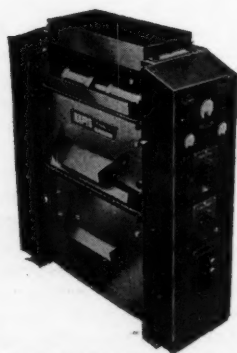
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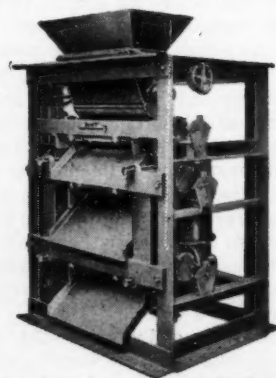
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Potash in Saskatchewan

Water-Bearing Sands Impede Mining

POTASH mineralization in Saskatchewan was first discovered at a depth of 7,700 ft. in core from an exploratory borehole put down in 1943 by Imperial Oil Ltd., near Radville in the south-east of the Province. It was not until mid 1946, however, when Bata Petroleum recovered core assaying 21.6 per cent K_2O over 11 ft. from a depth of only 3,500 ft. that substantial interest developed in the possibilities of commercial exploitation. Subsequent drilling and radioactivity logging have served to indicate the presence of potash deposits of very large proportions in total content probably exceeding the previously known world reserves estimated at some 55 billion tons of K_2O . Recoverable ore at depths less than 3,500 ft. and containing at least 25 per cent K_2O is estimated to total 6.4 billion tons, allowing 40 per cent extraction and 90 per cent milling efficiency.

The principal ore mineral in the Canadian salt basin is sylvinite, a mechanical mixture of halite ($NaCl$) and sylvite (KCl). Carnallite ($KCl \cdot MgCl_2 \cdot 6H_2O$) is also present, chiefly in the lower beds of the salt formation, but contains only 16.9 per cent K_2O equivalent against the 63.2 per cent of sylvite.

Nature of the Deposits.

The deposits are of marine origin and are believed to have resulted from the periodic isolation of an area of the sea at a time when, some 300,000,000 years ago, the area was experiencing a desert climate. The salt-bearing beds, or Prairie Evaporites, as they are called, are 600 ft. thick, in places with several potash-rich beds occurring in the upper 200 ft. Along the northern margin of the salt basin the evaporite formation begins at a depth of around 2,500 ft. from which horizon the dip is generally gently to the south.

Ground above the evaporites has been divided into four geological zones, as follows:—

- Zone 1. Glacial Drift. Clay, sand, gravel, boulders. Water-bearing.
- Zone 2. Shale with interbedded sandstone.
- Zone 3. Blairmore Formation. Sandy shales and sandstones with unconsolidated sands containing water at pressures up to 800 p.s.i.
- Zone 4. Dolomites, calcareous shales and anhydrite containing brine. Several formations water-bearing.

From the mining point of view, the unconsolidated

water-bearing Blairmore formations present something of a problem and in the first attempted extraction temporary setbacks are to be anticipated.

The Potash Co. of America were responsible for sinking the first shaft down to the potash using a freezing method to a depth of 3,000 ft. This shaft was concrete-lined throughout its length inside the frozen ground—a technique which has not proved entirely satisfactory. Recent reports note damage to this lining and the suspension of production while grouting the entire length of the shaft is undertaken. This work is in the hands of The Cementation Co. (Canada) Ltd. and is expected to be completed by early summer 1961 at a cost of \$900,000.

Difficulties with Concrete

Difficulties with concrete in cold conditions, of course, are well known. With lowering temperatures the speed of setting is decelerated and the chemical reactions involved in the hardening process so impaired that useful strength may be achieved slowly if at all; the freezing of pockets of water causes direct damage, and differential expansion of the various mix components on thawing can be highly deleterious. Concrete lined freezing shafts on the continent are provided with a layer of bitumen between the lining and the walls of the excavation to act as an insulator against both temperature and ground movement, in which circumstances they prove structurally successful and permanently water-tight.

International Minerals and Chemical Corporation (Canada) Ltd. at their Esterhazy project are tackling the problem of sinking through the Blairmore sands by freezing and lining with cast iron tubing. The initial 316 ft. of glacial drift at this mine was frozen, after which conventional sinking methods carried the shaft down through some 900 ft. of shale and sandstone to the Blairmore horizon, at which point freezing was resumed and installation of tubing commenced under the supervision of German experts.

The first attempts to mine potash in Saskatchewan were based on a solution method similar to that used in producing common salt but the experiment proved unsuccessful. Should a solution technique prove feasible, however, the potash rich deposits lying under deep cover on the south side of the main basin may well become commercial reserves to increase the already large deposits tremendously.

New Coal Reserves in the Raniganj Area

Recent mapping, structural interpretation and drilling work carried out by the Geological Survey of India have revealed the extension of two important coal seams in new areas of the Raniganj coalfield (W. Bengal) as potential sources of metallurgical coal. The operations have also indicated the presence of a very thick seam in the Ramgarh coalfield in Bihar with top section of the seam carrying grade I coal with a fairly high coking index.

The Hirakhun seam, the extension of which has been proved in Raniganj area, is partly coking and partly of selected grade.

The Dishergarh seam, discovered at shallower depths in

the south-western extremity of the Raniganj coalfield south of Damodar river, also has high grade metallurgical coal of selected grade. With a thickness of 8 to 10 ft. the seam is estimated to contain 15,000,000 tons of high grade metallurgical coal in an area of about 2 sq. miles. In addition to Dishergarh seam several other coal horizons—some high grade and others of inferior quality—have also been encountered.

The Ramgarh coalfield, situated about 10 miles from the site of the proposed Bokaro Steel Plant, has a 74-ft. thick seam of coking coal. The coal of the top section of this seam is a potential source of high grade coal, and also appears to be suitable for blending.

Machinery and Equipment

New Surveying Instruments

Three new items have recently been introduced in the field of Zeiss surveying instruments.

The Theodolite 120 is intended for work of lower accuracy in a wide variety of fields including other than geodetic tasks. This small theodolite is used primarily in structural and mining surveying, but also for simple geographical, geological and geophysical tasks and other work. With a very bright telescope and image contrast, the 120 is suitable especially in those fields where there are difficult conditions with regard to target illumination, target contrast against the background and possible assembly.

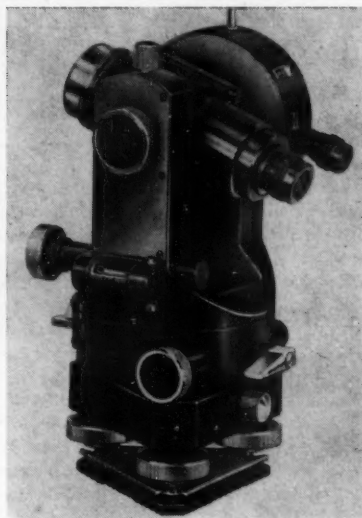
The Reducing Telemeter 006 was designed especially for detail surveys with cadastral accuracy. This is a double image rangefinder with the base in the instrument and with automatic reduction of inclined distances to the horizon. Over a distance range from 2 to 50 metres it is possible to determine, as required, horizontal or inclined distances without erecting a stadia rod at the survey point. The Reducing Telemeter 006, as a special instrument for precision tachometry, is especially suitable for detail surveys, angle measuring of polygonal traverses and the like.

A meridian finder has been developed for the theodolite 020, permitting the determination of the astronomical

azimuth of terrestrial target with an average error of approx. ± 1 . Compared to other methods of azimuth measuring this process has the advantage of not requiring a clock and of obtaining the azimuth without complicated calculations.

The range of photogrammetric evaluation instruments of VEB Carl Zeiss Jena has been extended by two new instruments. The Stereometrograph is a two-image evaluating instrument for graphical and numerical individual model evaluation of standard and wide angle vertical exposures up to a format of 23 cm. x 23 cm. at a scale of 1:2,000 to 1:25,000.

The Zeiss Co-ordimeter is a programme controlled recording and calculating machine for photogrammetric evaluating instruments, carrying out automatic recording of machine co-ordinates as well as programme-controlled calculations.



The Zeiss Theodolite 120

PERMANENT BARRICADES IN COLLIERIES

Recent disastrous mine fires in U.S. collieries have promoted reevaluation of fire fighting methods and equipment. Much emphasis has also been placed on personnel instruction, and on the maintenance of established escapeways from

all sections of the mine. Advisability and methods of erecting suitable barricades in emergency has received marked attention. These points have been the subject of an informative article in *Coal Age* by V. Price, general superintendent, Eastern Coal Corp.

Many mines have old and extensive workings. Many of these second escapeways, however, are difficult to travel due to water, low heights, and in places the necessity to skirt falls. Finally, the idea was conceived to erect permanent barricades underground at locations accessible to the working sections. The logical place to build these barricades appeared to be at the various substation locations where holes already have been drilled from the surface to the coal seam.

Our contemporary states that the first permanent barricade was installed during March, 1960, along the main haulage road in No. 4 mine. This barricade was centrally located for the four sections in that general area and was constructed with enough area included to accommodate all workmen in that area. The barricade was located in the centre of a five entry system which has intake air in Nos. 4 and 5 entries and return air in Nos. 1, 2 and 3 entries. At this location two separate 6 in. dia. holes had been drilled from the surface of No. 3 entry. One hole is used for D.C. power transmission lines from the rotary converter set in the surface substation. The second hole was a 2 in. pipe inside a 6 in. pipe. Compressed air from a surface-located 285-cfm. compressor is pumped through the 2 in. line to the right side of the mine where percussion air tools are used for roof bolting. Mine drainage water is pumped up through the hole in the area between the 6 in. and 2 in. pipes.

When the power and pumping facilities were installed, permanent cinder block stoppings were built at various places across entries. Barricade area is 1,700 sq. ft.

At the bottom of the hole containing the compressed air line, a system of valves has been installed so that in an emergency the air can be cut off from the working sections and diverted inside the barricade area, thereby setting up a positive pressure inside the barricade

Michigan (Great Britain) Ltd., have produced special purpose coal handling dozer blades for their Models 180 and 280 Tractor Dozers from their Camberley Works. Designed and engineered to meet the requirement of rapidly moving bulk quantities of coal into stocking-out grounds or reclaiming coal from stocks to feed hoppers, the Michigan coal blades have a larger radius of curvature than the standard blade, enabling the coal to be rolled more easily. The Michigan tractor dozer coal blade is constructed in horseshoe shape. Due to the Michigan power train system driving all 4 wheels on wide base low-pressure tyres, several advantages are obtained in using Michigan tractor dozers with coal handling blades including, compaction densities of up to 70 lb. per cu. ft., reducing the risk of spontaneous combustion, reducing moisture seepage, reducing coal contamination by crushing and reducing track costs in this abrasive material



which would prevent any explosion or mine-fire smoke and gases from entering the barricade. Oral communication from the barricade to the surface is possible through the power borehole. In an emergency the power cables could be quickly removed so that food and medicine could be lowered down the hole.

The greatest single advantage of the barricades has been the psychological effect on workmen. The actual cost of the barricades has been small since existing facilities have been used and regular ventilation men who are already on the job are doing the construction as time permits.

THE A.S.E.E. EXHIBITION

The A.S.E.E. Exhibition is being held at Earls Court from March 21 to March 25. Certain of the equipments to be displayed have applications in the mining industry.

Victor Products (Wallsend) Ltd. will be showing examples of its range of weatherproof - and - flameproof and weatherproof - and - vapourproof lighting fittings. This range is now enhanced by the provision of circulum chokes in certain of these fittings so that mercury-fluorescent lamps may be fitted with no other alterations to the installation. The necessary flameproof certification for this feature is, of course, held by the company.

A new fitting of cast aluminium alloy construction for two 2ft. tubular fluorescent lamps specially designed with shallow dimensions for recessing into reinforced concrete work will be on show. This is the first time a mass-produced special fitting for these lamps has been shown. This fitting may also be used suspended in the open air where it is both weatherproof and dustproof.

Ten divisions of *English Electric* will be exhibiting, namely Control Gear, Mining, Metal Industries, Electrical Plant, Rectifier, Switchgear, Industrial Machines, Fusegear, Transformer, Meters, Relays, and Instruments.

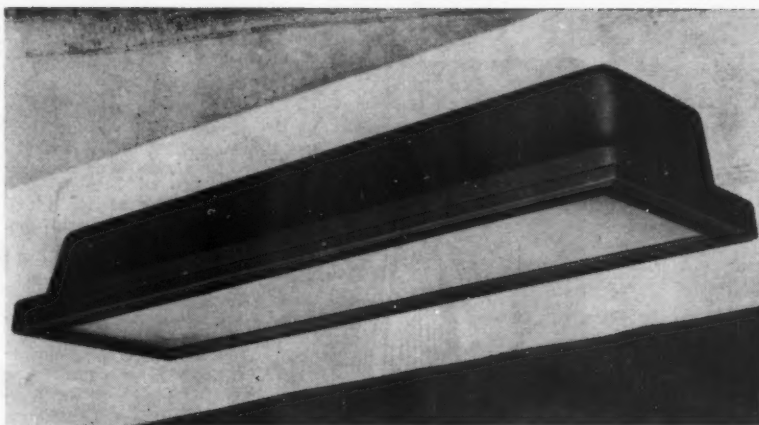
Contactless sensing devices such as limit switches, proximity devices and push-button switches from the Unistat range of static equipment, as well as transistorized logical elements from the Unistat range will be demonstrated with a working model of a mine car circuit, showing how mine cars can be removed from a cage, emptied and returned completely automatically. This exhibit has been arranged with the Mining Division.

The stand of *Brookhirst-Igranic Ltd.*, focuses attention on Bi-Stat, the company's static switching system emphasizing the ease of installation and depicting circuit testing and tracing, the simplicity of logic and connection diagrams with a saving of both space and maintenance.

A selection of batteries for a wide variety of applications will be shown by *Chloride Batteries Ltd.* Exide-Ironclad traction batteries will be displayed, featuring the unusual gauntlet plate construction, introduced just over a year ago. This design is claimed as the most important advance in traction battery development for 50 years.

Chloride Plante cells in glass and wood lead-lined boxes will be shown and the new range of Chloride high performance Plante cells is prominently featured.

Pritchett & Gold and E. P. S. Co. Ltd. high performance cells of the lead-acid Plante type are to be shown. These units are suitable for any kind of



Victor cast aluminium alloy fitting with alternative front frame to permit free weatherproof and dustproof suspension

stationary battery duty not requiring substantial discharges more frequently than about once a fortnight, such as switchgear operation, emergency lighting and telephone and telecommunications services. Special features of design result in a saving of up to 50 per cent in space or an increase of almost 100 per cent in current output compared with a standard stationary battery made to B.S. Specification.

Transformer Division of *Brush Electrical Engineering Co. Ltd.*, will display one 300 kVA dry type, air-cooled flameproof transformer for use below ground in gaseous mines with a voltage ratio of 3,300/565 three phase, 50 cycles. Switchgear Division will show a cross section of equipments representative of a wide range of extra high voltage and medium voltage switchgear and fusegear.

Electrical Rotating Machines division and Busbar Trunking division are also to exhibit.

A wide range of cells used for telecommunication switchgear and standby applications will be seen on the *Nife*

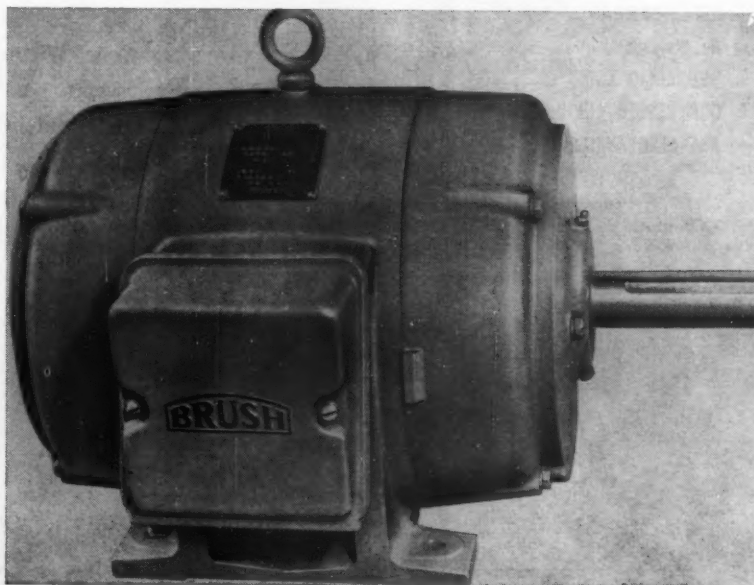
Batteries stand. In addition the Nife-O Matic switchgear unit which was introduced for the first time at the exhibition last year will be on display, together with a standard switch-tripping unit. The Nife-O-Matic is entirely automatic in operation and is proving very successful abroad as well as in the United Kingdom.

The lighting of the stand is to be protected by a self-contained Nife-Never-fayle minor emergency equipment.

The recently-announced revised Research Committee structure of *The British Electrical and Allied Industries Research Association*, is to be emphasized by the six-point presentation of the exhibits. Examples of current E.R.A. work, shown on the stand, are connected with insulation; generating plant; power supply transformers and switchgear; power supply lines and cables and both non-industrial and industrial applications of electricity.

Samples of the extensive range of Tudor stationary batteries and D.P. Kathanode traction batteries will be featured on the *D. P. Battery Co.'s* stand.

A Brush screen protected drip proof motor representing a range from 20 to 150 h.p.



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MINING MISCELLANY

The Common Market Commission has granted a sum of 11,775,000 florins for complete aerial photography of Dutch New Guinea, to trace exploitable mineral resources.

★

A research programme for utilizing U.S. lignite reserves is being studied by the Bureau of Mines.

★

Under Formosa's third Four-Year economic plan the authorities are to invest NT \$135,600,000 to development of mineral resources. Production targets set for 1964 include: coal, 4,600,000 tonnes; gold, 6,900 hectogrammes; silver, 23,600 hectogrammes; electrolytic copper, 4,350 tonnes; pyrites, 57,000 tonnes and sulphur, 7,000 tonnes. Coal reserves are estimated at 200,000,000 tonnes.

★

Formosa has sold a consignment of 30,000 tons of calcium cyanide to Japan for \$U.S.2,000,000, and further exports are expected.

★

An occurrence of manganese, 85 ft. thick, has been revealed by prospecting beneath the deposit discovered in 1956 at Serra do Navio, in the Amapa Territory of Brazil, and exploited by Industria e Comercio de Minerais in association with Bethlehem Steel. The original deposit had estimated reserves of 40,000,000 tons, 46-54 per cent Mn. A magnesite deposit, of over 1,000,000 tons, has been discovered by the Department of Mineral production in the chromite region of Minas Gerais, near Furnas.

★

Following the establishment of the Shawnee Poole system of earth moving in world markets over the last two years and the formation of a sales company last November, Shawnee Poole Ltd. has now established a training centre to provide new facilities for dealers, servicemen and operators. Courses last one week and will take place throughout the year. On Monday, March 6, the first full-scale course started with twelve representatives attending. A significant indication was the fact that of these students, ten were from the German Ford Co. Ford Werke of Cologne, sole distributors of the Shawnee Poole system in Western Germany, one from Austria and one from Switzerland.

St. John del Rey Mining Co. has formed a new company, Mineracao Morro Velho S.A. to work the Morro Velho gold mines of Brazil, with a capital of 1,100,000,000 cruzeiros. St. John del Rei will subscribe 25 per cent of the preferential shares, without voting rights, and will advance \$U.S.1,000,000 to finance a three-year development plan. Other neighbouring gold-bearing properties, including the Bicalho mine which has been flooded for some years, are also to be examined. A company is being formed to resume exploitation of the Morro de Ouro and Agua Limpa gold mines at Apiai, Sao Paulo, which were closed down during the war.

★

The Chicago and Northwestern Railway is to use infra-red heat rays to thaw frozen iron ore near its dock at Escanaba, Mich.

★

During 1959, Queensland's mining industry was able to report an increased production valued at £11,482,120 over the previous year's figures, bringing the State's total value of mined output to £47,188,611. This increase was largely due to the record tonnage of copper, and the increase in the value of uranium oxide produced. *The Report of the Department of Development and Mines, Queensland, for the year 1959* has now been published in Brisbane, and its contents include reports on the State's mineral industry, statistical tables, and geological survey report.

★

Drilling for new ore deposits will soon begin almost directly beneath the main shopping area of Broken Hill, Western N.S.W. Search is being made to replace Broken Hill's dwindling lead and zinc reserves, and drilling is to go to a depth of between 3,000 and 4,000 ft.

★

In India, over 800,000 tons of coal—40,000 wagon loads—have accumulated in the public sector collieries in Bihar and Madhya Pradesh owing to lack of adequate transport facilities, and the National Coal Development Corporation fear that this stockpile, if not cleared, may be doubled in a month's time. This might result in reluctant but unavoidable slashing of coal production at the be-

ginning of the Third Five-Year Plan. The biggest dump is at the Gidi coalfield, where 2,000,000 tons have accumulated. Against the Corporation's daily requirement of 2,000 wagons only 1,400 are available. India's Third Five-Year Plan includes the construction of five coal washeries: in addition to the one at Kathara, two are planned for Karanpuram and one each at Ramgarh and Madhya Pradesh.

★

A Japanese steel mission has visited Lisbon to discuss improvements to the Goanese port of Mormugao. Japan's import of iron ore from Goa in 1960 totalled 2,600,000 tons and she is reported to be considering doubling this in 1961, and may also supply part of the equipment to expand Mormugao shipping facilities.

★

The U.S.S.R. has signed an agreement under which India is to receive equipment for six projects costing 112,500,000 roubles on long-term credit. One project is a washery for coking coal, with an annual capacity of 3,000,000 tons, at Kathara, in Bihar. Czechoslovakia is to provide credit for the purchase of equipment for mining 100,000 tons of coal yearly from the Kalcot coalfield of Krishna.

★

The West German firm, Salzgitter Maschinen A.G. are to supply 19 drilling rigs to Greece, under a government agreement, in exchange for Greek iron ores; and 35 per cent of them are to be manufactured in Greece by the Greek Powder and Cartridge Co. on German specifications. It is estimated that the rigs would cost about DM.7,000,000, the value of about 200,000 tons of iron ores from the island of Thassos. Iron ore exports in 1960 were a little over 400,000 tons.

★

The value of Canada's mineral production in 1960 has been estimated at \$2,471,700,000 against \$2,409,000,000. British Columbia, with mineral production totalling \$175,300,000 (17 per cent above previous year), increased its percentage of the national production to 7.4 in 1960 from 6.6 in 1959.

★

The Prime Minister of Sierra Leone, Sir Milton Margai, has stated the

Courses on the Shawnee Poole system last one week. Illustration below shows British personnel under instruction. The first course for foreign representatives has recently concluded. The next non-British trainees will comprise a group of Scandinavians





Dorman Long (Steel) Ltd. have installed a trial quantity of p.v.c. coated Terylene ventilation ducting at their ironstone mine at North Skelton, Yorkshire. The ducting, similar to that now being used by the N.C.B., was made by Robert Watson and Co. Ltd.

government had no intention of nationalizing any commercial, mining or industrial undertaking, and that if new or unforeseen circumstances should lead to any change in this policy, the government acknowledged its obligations to pay fair compensation in every case of nationalization, and in the event of disagreement on this, to refer the matter to arbitration by some mutually agreed body, such as the International Bank of Reconstruction or the International Bank at the Hague.

Belgian lead production rose to 92,000 tonnes during 1960, against 88,000 tonnes, while electrolytic copper production reached a peak of 207,000 tonnes last year. Germanium production started in Belgium during 1960, and the Société Générale Métallurgique de Hoboken has recently opened its provisional plant for the production of electronic quantities of silicon, and is bringing a large-capacity silicon unit into operation shortly. The Belgian company Société des Mines et Fonderies de Zinc de la Vieille-Montagne reports that zinc output from its Belgian and French plants for the first half of 1960 reached 93,495 tonnes, compared with 87,590 tonnes for the same period of 1959.

Craigmont Mines, near Merrit in the Nicola Valley, Canada, start production of their copper-iron property on November 1 next, at a daily rate of 4,000 tons of ore.

The newly-established Australian Mineral Development Laboratories in Adelaide provide a comprehensive mineral investigation service to the public. By arrangement with the Commonwealth Government, the Australian Mineral Industries Research Association, and the government of S. Australia, the laboratories have taken over the responsibilities of the previous research and development branch of the South Australian Mines Department, and will be operated on a national scale.

Emperor Mines' exploration has proved extensive reserves on their property in Fiji, but development costs are high and the Fijian Government has been approached for an increased subsidy. This is not likely to be granted, however, because of the Colony's financial position. In the event of necessary funds becoming available it is estimated that the mine would have a future life exceeding 25 years.

Mangor Aust. Pty., a subsidiary of Union Carbide, is to explore for vanadium in an area of 22,000 sq. miles, extending from the Eyre Highway in the south, northward to Meekatharra.

Australia, and including the Mount Magnet and Roebourne districts. A visual survey is to be carried out from a Cessna aircraft, based on Kalgoorlie, and ground mapping on the temporary reserves will follow if results are encouraging.

In 1960 Bulgaria produced about 400,000 tonnes of iron ore, 3,058,600 tons of lead-zinc ore, 1,122,500 tonnes of copper ore and 37,700 tons of pyrites. Capital investment in ore mining during 1961 will cover the development of the iron ore mining project at Kremikovtsi, near Sofia, with an estimated annual output of some 5,000,000 tonnes; and the Medet copper project, with a fully mechanized enriching plant, with an estimated annual output of 8,000,000 tonnes. The Martinovo iron mine, in the Mikhailovgrad province should produce 600,000 tons annually by the end of 1961, and its flotation plant, with a daily capacity of 2,000 tons should be working at half-capacity by the end of 1961. The mines and flotation plants in the Rhodope mountains, are being extended and modernized.

Russia plans to produce 71,000,000 tonnes of raw steel in 1961, about 6,000,000 tonnes above the 1960 output.

Personal

Mr. C. B. Maxwell has been appointed director of Abelson and Co., with particular responsibilities for work service, spares and after sales service.

Mr. S. C. Brealey and Mr. J. T. B. Welbourn of Powell Duffryn Technical Services have recently returned from South America, where they have been carrying out consulting work for the Carbonifera e Industrial de Lota, in Chile.

Renold Chains Ltd. announces that Mr. L. J. Tolley, at present works director, has been appointed a deputy managing director, additional to Mr. W. S. C. Tully. Mr. E. E. Hemsall has been appointed general works manager in succession to Mr. L. J. Tolley.

Sir Henry Jones and Mr. W. K. Hutchison, chairman and deputy chairman of the Gas Council, with Mr. M. Milne-Watson, chairman of North Thames Gas Board, and representatives of Conch International Methane Ltd., have visited Algeria to see the natural gas field at Hassi R'Mel, and obtain information on a scheme for the possible importation of liquid natural gas to the U.K.

Mr. Edgar Stott, export sales manager of Turner Brothers Asbestos Co., is to retire after 42 years' service with the company. The new export sales manager will be Mr. J. C. T. Fell, who has held the same post with Ferodo Ltd., a sister company of Turners in the Turner and Newall organization. Mr. Fell takes up his new appointment on April 1.

Mr. Richard Melville has been appointed Scientific Attaché to the British Embassy in Paris.

Coming Events

The Ross Institute of Tropical Hygiene announce that they are holding their annual course for laymen on July 3 to 7 at the Institute. Those wishing to enrol should do so a month prior to the date of the course.

The theme of the 33rd annual meeting of the Lead Industries Association, to be held in Chicago on May 2 and 3, will be "Lead's New Frontiers". The opening session will be held jointly with the American Zinc Institute.

The Thirteenth Mining and Smelting Conference is being held in Frieberg-in-Saxony, East Germany from May 24 to 27 next. Open-cast and underground mining, ore and salt processing, and smelting and metal processing techniques will be discussed.

The 120th general meeting of The Institution of Mining Engineers will be held in the Great Hall of the Trent Building, The University of Nottingham on July 19 at 11 a.m., and 2.30 p.m.

The U.K. Atomic Energy Authority are to exhibit some of their work at "Achema" the West German triennial Chemical Engineering Exhibition and Congress, which is to be held at Frankfurt on June 9-17. Working models of the latest prototype equipment designed for the chemical processing of uranium ores and for separating plutonium-bearing solutions from those containing fission products will be on view, and much of this equipment can be used in ordinary chemical plants.

The 6th general meeting of members and associates of the Cornish Institute of Engineers will be held at the Camborne School of Mines March 24 at 7.30 p.m.

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Metals and Minerals

How Far Can Wolfram Slide?

The downward trend in wolfram prices gained further momentum in the past few days. On March 9, the London quotations for wolfram and scheelite (65 per cent) fell from 125s.-130s. per 1-ton unit c.i.f. Europe to 123s. 6d.-128s. 6d. They have since fallen further and are currently indicated at 120s.-126s. per 1-ton c.i.f. Europe. It is understood that sales have been made at the lower prices.

Thus wolfram has fallen by 24s. 6d. a ton since the beginning of the year and is now cheaper than at any time since November, 1959. The decline appears to have been triggered off mainly by sales of wolfram from Communist countries at rather more than the discounts normally offered on Eastern metal. Though the quantities involved have not been large, the successive offerings at heavy discounts have had the effect of chasing the market downwards. Had the demand been sufficiently buoyant, however, it would have been unnecessary for the U.S.S.R. to offer more than the normal discounts on the London price. Obviously it is not in the interests of the Russians to disrupt the market, particularly as they are believed to have negotiated long-term contracts with Austria and Western Germany on the basis of London prices. In their readiness to co-operate with the International Tin Council when the resources at the disposal of the Buffer Stock Manager were engulfed by the flood of Eastern metal, the Russians gave clear evidence, if such were needed, that in their approach to the metal markets they are as commercially minded as any Western power. However, sales of metal of non-Russian (Eastern European or possibly Chinese) origin have lately been increasing.

No up-to-date figures of world production and consumption of tungsten are available. Outside the U.S. activity in the tungsten consuming industries has been at a high level. In view of the recession in the U.S. steel industry, however, it is probable that U.S. consumption of tungsten must have declined during the fourth quarter of last year, though in the first nine months it increased by 29 per cent as compared with the corresponding period of 1959. Stocks of tungsten products at U.S. producers' plants rose by 14 per cent during September and this trend may well have been accentuated in the later months. Certainly the U.S. has virtually been out of the market since October, while French buying has also fallen off and the downturn in prices has also encouraged U.K. buyers to hold back.

As to how far the slide might go, there is no reason to anticipate any dramatic change in wolfram's statistical position unless and until the expected upturn in the U.S. economy materializes, although some recovery in the steel industry has already taken place. Nevertheless, the increasingly optimistic outlook which has been engendered by President Kennedy's vigorous approach to national and world problems, coupled with the more favourable auguries for Britain's economy in the coming year, could well lead to a more confident undertone in the wolfram market, which would soon be reflected in prices.

The Bolivian Mining Corporation (COMIBOL) stated recently that if the price of wolfram dropped to 100s. per 1-ton unit, five nationalized mines, producing some 50,000 kilos per month, would be closed. They would scarcely be the only casualties! However, there are hopes that the market can be stabilized at around 120s. and, with the brightening economic horizons, it would not be surprising if this occurred.

BRITISH COLUMBIA BERYLLIUM DEVELOPMENT

Drilling will start this year by International Beryllium Corp. on their properties 20 miles north-west of Cranbrook in British Columbia. Last year an open cut revealed beryl-carrying pegmatite containing both beryl crystals and lower-grade beryllium bearing material.

JAPAN PRODUCES MORE MAGNESIUM

Japan's light metals industry produced about 13 per cent more magnesium in 1960 than in the previous year. Preliminary figures for 1960 indicate a total output of about 5,635 s.tons against 4,940 s.tons. Of this total some 2,115 s.tons consisted of primary magnesium, about one-third more than in 1959. Recovery of secondary metal from scrap yielded some 3,007 s.tons (2,924). No magnesium was exported. Plant stocks (practically all secondary metal) at the end of 1960 stood at around 450 s.tons, constituting about one month's supply.

ALUMINIUM JOTTINGS

Aluminium shipments by U.S. domestic producers to consuming industries in 1960 amounted to 2,330,000 s.tons—approximately 6 per cent lower than the record total of 2,500,000 s.tons in 1959, reports the Commerce Department. Building and construction and transportation equipment accounted for more than 40 per cent of the consumption. According to the Department, the set-aside for military and atomic energy programmes in 1960 was 216,000 s.tons—unchanged from 1959.

Domestic primary production in 1960 is given as 2,000,000 s.tons, an increase of 3 per cent over 1959. Imports of primary metal and scrap recovery were lower, however, the total metal supply of 2,600,000 s.tons being 3 per cent under that of 1959. Shipments of mill products to consuming industries fell last year to 1,500,000 s.tons and were 10 per cent less than in 1959.

U.S. exports of crude aluminium amounted last year to 285,000 s.tons—an increase of 135 per cent—while exports of semi-fabricated shapes were 43 per cent higher. Imports of crude aluminium fell last year by 36 per cent to 154,000 s.tons and those of semi-fabricated shapes were 25 per cent below the 1959 total.

For the first six months of the current year aluminium sales in the U.S. look

like being at approximately the same level as in the corresponding period of 1959. In the second half of the year, however, an upswing is expected, in line with the anticipated upturn in the U.S. economy as a whole, which could, in fact, lead to a minor boom for aluminium. For the year as a whole, sales to domestic consumers could conceivably show a slight gain over 1960.

North American aluminium production will be reduced by approximately 20,000-25,000 tons in June this year, when Aluminium Ltd. shuts down its Kitimat smelter in British Columbia. The closure of the smelter is due to the necessity of carrying out repairs to a tunnel which supplies the Kemano hydro-electric station. The powerhouse and smelter are likely to be out of operation for five to eight weeks.

Reynolds Metals has announced its intention of cutting back aluminium production by approximately 7 per cent at its Troutdale, Oregon, plant to adjust inventories. The plant has an annual capacity of 91,500 tons.

★

Mitsubishi Chemical Industries Ltd., a leading Japanese chemical producer, has announced the conclusion of contracts with Pechiney, of France, and Electro Kemisk A/S of Norway, for technical assistance to start primary aluminium production. Under the current contract with the Pechiney Compagnie de Produits Chimiques et Electrometallurgiques, Mitsubishi Chemical Industries is to receive technical aid for the construction and operation of electric cells of 100,000 amperes for aluminium smelting. The contract with Electro Kemisk provides for technical assistance on Soderberg vertical spike electrodes required for the Pechiney electric cells.

Mitsubishi Chemical Industries plans to complete the construction of plants for alumina and aluminium production in Naoetsu, northern Japan, by October, 1962, when it will start production of 30,000 tonnes of primary aluminium per year. It is one of two newcomers to the Japanese industry, the other being the Nishio Steel Manufacturing Co. (*The Mining Journal*, February 17, p. 193).

One of the three existing producers, the Nippon Light Metals Co., recently announced an expansion programme which will more than double its present primary aluminium producing capacity by 1965. Under the plan as announced, Nippon—in which Aluminium Ltd. holds a half-interest—aims to increase its capacity to 84,000 tonnes during 1961, to 95,000 in 1962, 100,000 in 1963, 125,000 in 1964, and to the projected 150,000 tonnes in 1965.

★

The new aluminium plant jointly financed by the Venezuelan Government and Reynolds Metals is planned to start operating within two years near Puerto Ordaz on the river Orinoco. The plant, which will take nine months to construct and will cost \$33,000,000, will play an important part in the government's plans for the development of the Venezuelan Guayana, the south-eastern part of the country below the Orinoco, which contains not only rich manganese and bauxite deposits, but also iron ore reserves estimated at 4,000,000,000 tonnes. This high grade ore will be reduced in a State-owned steel mill in Guayana and the two plants, when in operation, are expected to attract a large number of satellite industries.

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Copper • Tin • Lead • Zinc

(From Our London Metal Exchange Correspondent)

The effects of the revaluation of the German and Dutch currencies continued until the end of last week in spite of denials from every quarter that additional revaluations were likely to take place. It has been a week when consumer demand everywhere has been below recent levels except, perhaps in the case of tin.

HIGHER COPPER STOCKS

The price structure of copper has tended to weaken, with the intake price of scrap of the U.S. customs smelters being reduced to 23½ c. per lb. and the Belgian price being reduced from the equivalent of approximately 28.80 c. per lb. to approximately 28.10 c. per lb. New York or Antwerp. The former took place as offerings of scrap became more plentiful, partly owing to lessening demand from Japan and partly owing to better weather in some parts of the United States; the latter, probably in sympathy with a weaker tendency in London and in U.S. export quotations. Stocks in official warehouses in the U.K. rose by 125 tons to a total of 15,515 tons, and on the Exchange itself there has been a greater activity in dealings for cash metal.

In Chile the dock strike continues, but it is not felt that it will result in any serious dislocation of shipments of copper and it has not been a market factor.

The U.S. Copper Institute figures for the month of February showed that pro-

duction in the U.S. was still falling, but that deliveries also remained at an unsatisfactory level. Outside the States there was an appreciable fall in deliveries to fabricators, and as there was very little difference in the production of refined copper, stocks rose considerably. The exact figures, with the January figures in parentheses are (in s.tons):

Inside the U.S.

Refined Production	134,812	(144,697)
Deliveries	93,029	(99,794)
End of month stocks	147,799	(144,132)

Outside the U.S.

Refined Production	169,968	(173,974)
Deliveries to fabricators	194,457	(211,749)
End of month stocks	308,692	(292,776)

TIN SHORTAGE BEGINS TO BE FELT

The meeting of the International Tin Council was concluded at the end of last week. Two statements of special interest which emerged were first that the production of tin in the Congo was nil at the present time, and second that as far as the new agreement is concerned, it was not mandatory that this should open with a stock of 12,500 tons of physical metal—in fact, it was envisaged that the holdings of the old buffer stock (which now amount to about 11,000 tons) would be used as the basis, the balance being made up in cash. As expected, the free export of tin was permitted for the next

and last quarter of the old agreement, and a further meeting would be held within two months, presumably to finalize the details of the transfer to the new agreement.

The tin market itself has been extremely lively and the shortage of supplies is now beginning to be felt. Price movements have been fairly violent. Stocks fell in official warehouses by 29 tons to 9,990 tons, and in Malaya it was reported that at the end of January stocks of tin amounted to 12,070 tons, as compared with 12,664 tons, at the end of December.

These figures, in addition to the slowing down of shipments reported last week, indicate that the buffer stock manager may have to make a decision in the very near future as to whether to make sales at the £830 level or whether he will have to rely on other sources of supply, such as the Canadian Government stockpile, to enable him to keep the rise from getting out of hand and conserving his available metal to defend the upper limit of £880 per ton.

On Thursday the Eastern price was equivalent to £822½ per ton c.i.f. Europe.

FIRMER TREND IN LEAD-ZINC MARKETS

The lead and zinc meeting in Mexico City has now commenced, with the experts engaged in producing statistics to put before the full conference on Monday. The markets have shown a firmer tendency in spite of lack of optimism over the expected results of the conference. The precarious position of both metals is underlined in the U.S. Bureau of Mines Report that the production of lead in January totalled 23,000 s.tons, being the largest since April of last year, and further that in the case of zinc, the latest stock figures show that in February stocks of refined zinc rose to 214,956 s.tons, the highest figure for 2½ years. The main increase was in stocks of special high grade zinc, indicating the continued slow working in the motor car industry.

In the U.K. stocks of lead fell by 26 tons, giving a total of 10,421 tons, whilst stocks of zinc fell 360 tons to a total of 3,039 tons.

OFFICIAL TURNOVERS

Official turnovers in long tons for the week ending March 11, with the previous week's figures in parentheses, are:—

Copper	10,525	(16,650)
Tin	1,005	(1,520)
Lead	8,500	(8,650)
Zinc	6,725	(7,675)

Closing prices are as follows:

	March 9 Buyers Sellers		March 16 Buyers Sellers	
COPPER				
Cash	£224½	£225	£224	£224½
Three months	£226½	£226½	£225½	£225½
Settlement		£225		£224½
LEAD				
Current ½ month	£65½	£65½	£66½	£67
Three months	£66½	£66½	£68	£68½
TIN				
Cash	£806½	£807	£815	£815½
Three months	£809	£809½	£817	£818
Settlement		£807		£81½
ZINC				
Current ½ month	£84½	£84½	£86½	£86½
Three months	£83½	£83½	£84½	£84½

LONDON METAL AND ORE PRICES, MARCH 16, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 1½. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 7½d.
Iridium, £20/£23 oz. nom.
Lanthanum (98% 99%) 15s. per gram.

Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96% 98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmidium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s. Imported £28/£28½
Quicksilver, £69 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79½d. f. oz. spot and 80d. f'd.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	25s. 0d./27s. 6d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	250s./260s. per l. ton unit BeO
Bismuth	30% 5s. 0d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
Refractory 40%	£11 0s. 0d. per ton c.i.f.
Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1)	Nb ₂ O ₅ : Ta ₂ O ₅ 165s./170s. 0d. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 34% Li ₂ O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46% 48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43% 45%)	69d./71d. c.i.f. nom.
Manganese Ore (38% 40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£25 10s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	120s. 0d./126s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 95% V ₂ O ₅	7s. 6d./8s. per lb. V ₂ O ₅ c.i.f.
Zircon Sand (Australian) 65-66% ZrO ₂	£16/£16 10s. ton c.i.f.

Mining Finance

So It Had To Come!

Wednesday evening's announcement from Lancaster House of South Africa's decision not to apply for readmission to the Commonwealth when she proclaims a Republic at the end of May will come as no surprise to those who appreciate the utter singleness of purpose with which Dr. Verwoerd and his colleagues are moving towards what they regard as the only possible solution for the Union's racial problem. It was probably never on the cards that any concession to principle could be expected from the descendants of the Voortrekkers and presumably Dr. Verwoerd only made his visit to London in the hope that his critics would compromise with principle in the interest of unity.

That they have not done so is clearly of vital importance for the Commonwealth's continued influence among the politically uncommitted countries of Africa and Asia, and although South African stock markets will almost certainly take a beating—if only at the jobbers' boards—it is difficult to visualize the Union's economic position *vis-à-vis* the rest of the world being in the short term appreciably worsened by the event.

South Africa's trade relations not only with Britain but probably with a majority of Commonwealth members are unlikely to change. So called Commonwealth preference is in fact a system of bilateral trade agreements mainly between Britain and other Commonwealth members and as was seen in the case of Eire, such agreements are not subject to automatic cancellation on withdrawal from the Commonwealth; indeed for the most part they seem likely to continue. Moreover, those which are the most likely to be annulled are those having the least impact on the Union's terms of trade.

It is more probable that the immediate consequences of South Africa's decision will be seen both in an intensification of anti-South African pressure in the United Nations (the future of South West Africa must surely become an immediate issue) and similarly we must expect political repercussions in the Union itself although it is impossible to predict whether these will take the form of unifying the country behind Dr. Verwoerd's policies or of intensifying the split which has already developed between the Cape and Transvaal Nationalists and within the Dutch Reformed Churches on the future of the urban African, some 6,000,000 of whom will be left in white South Africa after the realization of Bantustan.

Finding the finance and expanding foreign trade are both crucial elements in the achievement of this ideal, and it can hardly be said that the events of this week have made the task any easier. The rest of the world may not like the solution which South Africa is seeking for her racial problem, but at least it is to be preferred to a perpetuation of the *status quo*.

Meanwhile, like most other observers, dealers in the South African Gold share market could not make up their minds in the earlier part of this week whether or not the Commonwealth Prime Ministers' discussions would result in South Africa staying in the Commonwealth. In very tight trading conditions share prices thus

reflected each change in general opinion. Business, however, was very small and when occasional buyers appeared they disclosed a severe shortage of shares in the market.

Ironically, it was in the later dealings on Wednesday that London decided that South Africa would, after all, stay in the Commonwealth. Share prices strengthened, Western Holdings moving up 3s. 9d. to 141s. 10½d. under the additional stimulus of the increased interim. Other price gains ranged up to 1s. 10½d. in the case of Free State Geduld at 115s. Among Diamonds, De Beers improved afresh to 153s. 9d. in front of the results.

News that South Africa was not to apply for continued membership of the Commonwealth came well after market hours on Wednesday. The decision could have been hardly expected to help the market and after the rally at the close of dealings on Wednesday, all Kaffirs were marked down substantially the next morning. Amongst the leaders Freguls dropped 12s. 6d. and Holdings 9s., whilst Anglo's lost 7s. 6d. The general mark down was initially about 7 per cent, but bargain hunters soon appeared and there are signs of a slight recovery. Probably the most significant point is the extreme narrowness of the market. Moreover, the longer term repercussions may not be very serious. Gold investors have certainly survived far greater shocks in the past and the latest move was not entirely an unexpected one.

As far as the companies themselves are concerned, the latest decision should not have any especial significance. Thus the mining finance houses will not find it any easier to find fresh capital from non-African sources, but this supply has already been virtually cut off since Sharpeville, and their need for new capital is not immediate.

The mines themselves should carry on much as before; it is unlikely that there will be any change in official policy towards the sale of gold to London nor is it thought likely that the Union Government will adopt any measure which would interfere with the vital earning power of its gold industry.

As far as investors in Kaffirs are concerned, they seem virtually certain to have to face a temporary fall in the value of their investments. But there is no question of any discrimination against foreign shareholders by a fully independent Union Government. South Africa made this quite clear at the time of the decision to become a republic. Holders who sat tight after Sharpeville (and they were the majority) are unlikely to be stampeded now.

GOOD WESTERN HOLDINGS DIVIDEND

The "little" half-yearly dividend season in South African gold shares—the main one comes along in June—has only thrown one real gleam of cheer on to the market. Western Holdings has continued its ebullient expansion by raising its payment by another 6d. compared with last March to 4s. 6d. per 5s. share

London Market Highlights

The effects on the Kaffir market of the discussions at the Conference of Commonwealth Prime Ministers, culminating in the announcement of South Africa's decision to leave the Commonwealth, are discussed on this page.

In other sections of the mining markets the most notable feature was the sudden strength of the tin section. The International Tin Council's statement underlined the extremely strong statistical position of the metal and investors took the hint by coming forward in force for shares of the leading producers and investment concerns. Among the widespread advances in prices Southern Kinta spurted 3s. to 33s., Ayer Hitam put on a similar amount to 33s. 3d. and British Tin were 3s. 6d. up to 42s.

Coppers also moved ahead on a growing feeling that a solution would be worked out for the Northern Rhodesian political impasse. Nchanga gained 4s. 3d. to 48s. and Chartered rose 1s. 6d. to 69s. 6d. Congo issues also gained ground "Tanks" rising 3s. 6d. to 29s. 9d. in line with a revival of Continental demand for Union Minière.

which will undoubtedly raise hopes that next September's final will also see an improvement on the 5s. 6d. declared last September which made a total of 9s. 6d. for the financial year that ended in that month.

If Holdings is indeed going to improve on this aggregate in 1960-61 then higher earnings will be needed for the rest of the period, but this is, of course, quite possible as crushings climb from last month's 160,000 tons towards the present plant capacity of 175,000 tons. The record January profit, for instance, was equal to an annual earnings rate, after the current 55 per cent tax liability, of 13s. 6d. a share. Capital expenditure this year is estimated at £1,600,000 which would absorb 4s. 3d. a share if all taken from profits. Altogether, it looks as though the increase in the interim ranks as an expression of faith by the management in the buoyancy of Western Holdings' revenue in coming months.

Company	Sept. 1959	Mar. 1960	Sept. 1960	Mar. 1961
	s. d.	s. d.	s. d.	s. d.
F. S. Geduld	4 6	3 6	5 0	3 6
P. Brand	3 0	2 6	3 0	2 6
P. Steyn	1 3	1 0	1 0	0 9
St. Helena	1 9	2 3	2 9	2 3.6
Welkom	0 3	0 3	0 4	0 3.6
W. Holdings	5 0	4 0	5 6	4 6
Winkelhaak	—	—	0 4	0 6

As the accompanying table summarizing the dividends for the last four half-years shows, a dispiriting story is coming from President Steyn, but shareholders should have been well prepared for this in the light of the chairman's remarks in recent times. As lately as January he said that "it may well be necessary to adopt an even more conservative dividend policy pending the accrual of the benefits which, it is anticipated, will be obtained from the commissioning of the No. 3 shaft system". These benefits will not begin to accrue until the next financial year to September, 1962. Free State Geduld has

managed to maintain its interim as indicated by the chairman.

Winkelhaak is the odd man out in that it is not an Orange Free State company, but this concern, the first of the producers in the new Kinross gold field away to the east of the old eastern Rand, has decided to join the "little" dividend season and declare its dividends in March and September, although its financial year runs to December 31. That of last September was a maiden distribution. The present 6d. per 10s. share ranks as an interim for 1961 and was in line with general expectations. The mine began production in 1958.

LORAINÉ BROUGHT UP TO DATE

At the meeting of Lorainé Gold Mines, the O.F.S. concern which has taken on a new lease of life with the opening up of the Riebeeck area, the chairman, Mr. B. L. Bernstein, followed his usual practice of bringing the development position up to date. During January and February 13,966 ft. were accomplished in the Riebeeck section but only 2,173 feet here were on the Elsburg reefs and they gave 66 per cent payability with an average value of 30.51 dwts gold per ton over a channel width of 29.5 inches equal to 900 inch-dwts. This continues the sharply increased values of the December quarter when 931 inch-dwts were obtained from these reefs against only 451 inch-dwts in the preceding three months. (See page 317.)

In answer to a shareholder's question Mr. Bernstein admitted that a value of approximately 20,000 inch dwts had been encountered on these reefs, but added understandable warning that "this should not be used in making an assessment of the mine as negligible values are also found in close proximity to such values". But this disclosure will no doubt serve to keep the speculative pot boiling in Lorainé 10s. shares at 26s. 6d. which tend to be strongly favoured by Johannesburg from time to time. They are, however, at this stage in the mine's development, only for the bold.

As the chairman himself said, there has been much speculation regarding the total tonnage of payable Elsburg reefs in the mine. Work done to date has proved that the upper and lower Elsburg zones are continuous from the southern boundary of the original Lorainé mine in the north right down to the new No. 3 shaft, but until the number of reefs and the extent of their payability on dip are known it is impossible to make any such assessment. This must await a good deal more work and in the meantime any consideration of an increase in the mill capacity must be deferred.

The percentage of higher grade Elsburg ore being sent to the mill is increasing and stoping is about to start in the No. 3 shaft area. This will mean improving mill grade, but as announced in February profits have not risen fast enough to prevent the company having to make fresh borrowings. In the more distant future Mr. Bernstein mentioned the probability of another shaft being necessary between the No. 3 shaft and the southern boundary of the Riebeeck area.

WELCOME MOVE BY DE BEERS

De Beers has at last included in its preliminary profit announcement the group results instead of merely those of

the parent company itself, which has been the practice in the past. This is indeed welcome now that there is such a marked discrepancy between the two figures owing to the De Beers group's big spread of interest beyond its purely diamond operations. As expected, the dividend is maintained at the previous year's advanced rate of 12s. 6d. with a final of 7s. 6d. per 5s. Deferred share. Following the continued prosperity of the diamond trade in 1960, which led to a record value for gem sales and only a small falling off in total turnover compared with the 1959 peak, De Beers itself made a net profit after tax of £13,331,579, an increase of £908,228. The consolidated group profit of £22,530,009 is, however, down by £1,651,748 as a result mainly of a sharp rise from £452,735 to £2,725,587 in the amount written off investments and an advance from £288,458 to £1,471,821 in expenditure on prospecting and research, possibly a reflection in part of the money spent on the project to manufacture synthetic industrial stones.

What are the 1961 prospects? Over-shadowing everything at the moment will be South Africa's withdrawal from the Commonwealth. This should not, however, do anything to harm the trade in diamonds, still believed to be buoyant. There will also be the effects of De Beers' participation in the big Rand Selection re-organization scheme. All in all, Mr. Harry Oppenheimer looks like having even more than usual to talk about in his annual statement. The full report is due in May. Meanwhile, the 5s. Deferred at 153s. 9d. cum dividend offer a yield of 8.4 per cent before allowing for double tax relief. It is worth bearing in mind that with annual dividends amounting to as much as 250 per cent De Beers must surely one of these days bring a more realistic touch to its nominal capital by a major capitalization issue.

COMMANDER GRENFELL IS OPTIMISTIC ABOUT COPPER

Confidence in the long-term future of copper was the keynote of Commander H. F. P. Grenfell's speech at the meeting in Salisbury, Southern Rhodesia, of M.T.D. (Mangula) the copper-producing subsidiary of Messina. The annual reports of both companies were commented on here on March 3. (See also p. 319.)

Commander Grenfell thinks that consumption of the metal will continue to rise year by year in line with higher standards of living not yet enjoyed by a majority of the world's population. Failing the discovery of large new deposits the potential purchasing power of these people, added to the normal annual increase in consumption, "may well result in a demand for copper which the industry will find difficult to meet". Consequently Commander Grenfell continues to hold a confident view of Mangula's future.

He is well aware, of course, of the present over-supply position of the metal and its lower price. Against this Mangula will have the advantage in most of the current financial year to next September of the economies that should be effected by its concentrates being treated locally at the new Alaska smelter instead of being sent abroad. It is also hoped that this young mine's two Aero-fall mills will show a further operational improvement as time goes on.

PETALING TIN'S OUTPUT HOPES

To-day the meeting is being held in Ipoh of Petaling Tin. In the chairman's annual statement Mr. D. C. Thomson says, as pointed out here last week, that whereas only No. 6 dredge worked throughout the last financial year to October 31, No. 4 resumed operations on September 1, No. 3 was ready for re-commissioning at the end of December while the utilization of No. 5 dredge is constantly under review.

It thus looks as though the company may be able to raise its output further in the current quarter following an increase from 323½ tons to 416½ tons of concentrates in the December quarter. Looking a little further ahead there are the possibilities of the opencast mine being developed in the deep enrichment located in the area previously worked by Nos. 3 and 4 dredges. This is expected to start up within the next few months.

In order to finance the venture and to clear the bank overdraft a proportion of the company's investments was sold, as it was considered that the money could be more profitably utilized in developing this project. Petaling's Malayan dollar shares have improved to 12s. along with the strength of tin shares generally, but they could be further responsive if the March quarter return, due to be published in mid-April, should prove to be a good one.

BIBIANI'S RESERVES HALVED

Bibiani's thirty-fourth and probably last annual report shows that whilst the company had been able to declare dividends during the past financial year it had in fact made an operating loss of over £80,000. However, probably even more serious is the ore reserve position. During the year to September 30, the reserves dropped from 791,066 to 324,528 tons and in relation to this the increase in grade by almost a dwt. is insignificant.

Net current assets, ignoring stores and plant in transit, are equivalent to 1s. 1d. per share. The Ghana Government take-over offer is 4s. per share. This offer was to have closed on April 5, but it is now understood that it will be held open until later in the month.

FEBRUARY GOLD RETURNS

The profits for the month of February are generally lower than they have been for some months as a result of the fall in the price received for gold which at 250s. 7½d. is as low as it has been since September of last year. This fall follows the announcements from the White House concerning the position of the dollar and it is unlikely that there will be any substantial recovery during the next few months.

The estimated uranium revenues are a little confused this month by the inclusion in some cases and exclusion in others of the provision for royalty payment. In the case of mines which have made a small purchase this is probably not significant but where the total quota has been sold for a royalty the profit figures are somewhat meaningless without including the royalty revenue. It is to be hoped that the industry will

(continued overleaf)

MINING FINANCE—Continued

be making both full and uniform announcements at the time of the Quarterly.

The operations at the S. Roodepoort mine were adversely affected by the underground explosion which occurred there on February 17, though the loss of profits is covered by insurance. Similarly the operations at Robinson Deep were affected by a severe pressure burst which has meant the temporary loss of a stope face. It is unlikely that operations will be back to normal until April.

Copperbelt Dividends.—The higher level of dividend payments which was established last year by both the Rhokana Corporation and Rhodesian Anglo American has been maintained in the interim dividends of these companies announced last week. Rhokana is to pay an interim dividend of 1s. 6d., net of Rhodesian tax, whilst Rhoango's declaration is 2s. In both cases these interim dividends are the same as those declared last year when the total dividends were 5s. 6d. and 6s. respectively. Bancroft, not unsurprisingly, have made no interim declaration; though it is of interest to note that during December a production record of 5,823 s.tons of copper was established there.

Rix - Athabasca Interested in Silver.—After closing down its Canadian uranium operations Rix-Athabasca is now seeking new avenues for investment. In the annual report it is revealed that the company has current assets totalling \$1,142,366 which it is hoping to employ in new mining ventures. Since before the closing of the uranium property the company has been exploring a silver prospect in Ontario and has had some encouraging drilling results. One intersection showed 153.5 oz. over 3.8 ft. and another 109.5 oz. over 9.4 ft. With the increasing demand for silver (*The Mining Journal*, March 10) a primary producer such as this could be a very interesting proposition.

Another subsidiary of the Rio Tinto Company, the Rio Tinto Mining Co. of Canada and two other mining companies have agreed to sell their controlling interest in Cons. Quebec Gold Mining to an unnamed company that wishes to re-enter the mining business. The deal involves 885,860 Cons. Quebec shares and as part of the transaction Rio Tinto will purchase 28,795 shares of Rio Algom from Cons. Quebec for \$236,119.

North Charterland Improve Profits.—After almost doubling their profits during the 1959 financial year North Charterland have again increased them from £20,034 to £24,412. However, the directors have elected to maintain their conservative dividend policy appropriating only £7,989 (2d. per share) to dividends. The general reserve account is to be increased by £17,000. Meeting, Salisbury, May 10, 1961.

The Rio Tinto Mining Co. of Canada announces that Mr. J. N. V. Duncan has been elected chairman of the board in succession to Mr. J. H. Hirshhorn, who retired in January. This appointment will not affect Mr. Duncan's position as managing director of The Rio Tinto Co., London, which he has held for just over ten years.

Rand and Orange Free State Returns for February

GOLD OUTPUT AND PROFIT

Company	February 1961				Current Financial Year				Last Financial Year			
	Tons (000)	Yield (oz.)	Profit (£000)	Year ends	Tons (000)	Yield (oz.)	Profit (£000)	Total to date	Tons (000)	Yield (oz.)	Profit (£000)	Total to date
Gold Fields												
Doornfontein	110	46,206	254.2	J	850	351,250	1894.3	757	307,798	1523.8		
Libanon	117	28,498	75.2	J	934	224,373	569.5	887	228,712	499.3		
Luipaards Vlei	66	11,803	3.5	J	539	94,785	40.5	560	98,610	43.0		
Rietfontein	12	3,240	1.4	D	24	6,424	2.4	32	8,447	14.4		
Robinson	39	9,358	0.2	D	82	19,237	3.6	94	18,577	120.2		
Simmer & Jack	70	12,448	0.4	D	140	25,296	0.5	156	26,963	138.8		
Sub Nigel	64	14,723	10.5	J	527	120,325	115.8	527	123,968	154.0		
Venterspost	117	34,041	75.7	J	963	271,979	616.4	1,008	254,939	494.0		
Vlakfontein	50	18,546	89.3	D	102	37,357	182.4	101	36,209	170.6		
Vogels	79	17,001	13.2	D	162	34,605	32.0	174	37,214	44.0		
West Drie	130	121,577	1052.3	J	1,040	979,636	8665.9	858	785,687	6668.7		
Anglo American												
Brakpan	137	17,000	14.4	D	283	34,760	34.9	276	33,742	20.5		
Daggas	220	44,534	215.9	D	422	89,504	441.5	461	92,808	455.6		
East Daggas	104	17,870	41.2	D	212	36,230	85.9	206	34,731	77.7		
F. S. Geduld	95	83,173	677.1	S	474	411,236	3366.7	470	401,594	3230.4		
President Brand	118	93,227	802.6	S	588	467,579	4097.0	577	473,249	4188.4		
President Steyn	106	39,712	164.6	S	530	197,945	860.7	509	200,641	948.2		
S. A. Lands	102	20,827	49.1	D	204	41,786	99.7	187	39,005	82.8		
Springs	90	12,584	13.5	D	184	25,407	29.4	209	28,820	30.5		
Vaal Reefs	100	46,501	250.6	D	203	94,397	516.2	188	84,600	453.1		
Welkom	95	29,847	55.9	S	486	153,542	350.8	487	153,538	380.6		
Western Holdings	160	110,001	935.0	S	786	537,092	4607.4	709	465,811	3827.0		
West. Reefs. Ex.	140	40,601	129.4	D	279	80,911	260.5	269	75,595	257.1		
Central Mining												
Blyvoor	127	82,391	622.8	J	1,064	690,553	5279.9	1,022	670,025	5089.2		
City Deep	106	21,990	3.0	D	225	46,258	9.6	218	45,880	12.2		
Cons. M.R.	46	9,765	2.6	J	410	87,147	28.0	715	135,201	57.5		
Crown	177	30,876	1.2	D	366	63,695	3.2	409	67,528	20.3		
D. Roodepoort	177	32,701	45.0	D	369	67,644	97.2	375	68,512	98.9		
East Rand Prop.	224	49,491	50.1	D	460	101,107	116.2	424	109,185	185.5		
Harmony	172	70,096	335.7	J	1,354	548,159	2579.4	1,135	452,019	2013.7		
Modder East	54	6,109	0.7	J	806	82,241	4.7	1,080	105,854	10.4		
Rose Deep	21	3,958	0.9	D	46	8,248	3.6	53	8,870	1.7		
J.C.I.*												
Freddies Cons.	59	13,047	127.5	D	120	26,095	154.2	117	26,664	181.0		
Govt. G.M.A.	44	9,187	14.0	D	96	18,721	17.9	105	21,206	1.1		
Randfontein	16	3,345	1.5	D	33	6,228	2.1	47	8,806	6.3		
Union Corporation												
East Geduld	125	35,938	221.5	D	250	71,876	440.8	262	77,431	504.4		
Geduld Prop.	75	12,001	21.1	D	155	25,006	48.0	147	27,092	57.5		
Grootvlei	210	43,472	213.9	D	425	87,979	438.1	425	88,833	457.4		
Marievale	92	22,402	114.4	D	191	46,508	243.4	195	47,797	246.3		
St. Helena	170	59,935	380.2	D	348	121,794	782.0	310	103,078	635.2		
Van Dyk	70	11,372	4.5	D	143	22,783	10.5	139	23,921	22.6		
Winkelhaak	90	30,826	167.4	D	185	63,127	346.9	159	48,615	204.5		
General Mining												
Buffelsfontein	148	65,419	377.1	J	1,179	490,492	2719.1	1,155	445,093	2352.9		
Ellaton	25	5,859	16.7	D	51	11,798	35.1	57	13,542	54.2		
S. Roodepoort	26	6,431	16.8	J	237	57,222	182.5	239	57,042	182.2		
Stillfontein	171	78,300	421.8	D	342	155,806	853.9	307	138,230	736.7		
W. Rand Cons.	123	18,098	6.7	D	253	37,071	20.1	251	35,514	13.8		
Anglo Transvaal												
Hartebeestfontein	126	58,275	316.4	J	983	457,204	2628.6	777	390,145	2413.8		
Lorraine	81	20,655	13.9	S	408	94,360	150.8	390	80,201	190.7		
N. Klerksdorp	10	1,380	1.4	D	21	2,739	1.3	22	2,447	1.1		
Rand Leases	176	24,024	18.7	J	1,493	211,744	39.1	1,487	222,120	190.6		
Village M.R.	32	4,095	1.5	S	240	33,596	127.0	242	37,376	5.7		
Virginia O.F.S.	123	26,420	141.3	J	975	207,368	1,201.9	1,067	243,811	149.4		
Others												
N. Kleinfontein	70	9,566	2.3	D	144	19.6	6.0	157	19,824	0.2		
Wit. Nigel	19	4,204	4.5	J	159	35,112	42.1	148	34,865	40.8		

Gold has been valued at 250s. 7d. (January 253s. 3d.) per oz. fine. L indicates loss. *Working Profit includes sundry revenue. Tables exclude profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

ESTIMATED URANIUM REVENUE

Company	Year ends	Feb. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)	Company	Year ends	Feb. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)
Goldfields					J.C.I.				
Doornfontein	J	13.5	116.5	119.0	E. Champ. d'Or (b)	D	5.1*	10.6*	14.1*
Luipaards Vlei (a)	J	110.0	738.0	746.0	Freddies Cons. (c)	D	32.5*	64.5*	62.0*
Vogels	D	53.0	106.5	110.0	Govt. G.M.A.	D	23.0*	46.0*	46.1*
West Drie	J	49.0	392.0	400.0	Randfontein (a) (c)	D	138.0*	273.0*	220.1*
Anglo American					General Mining				
Daggfontein (c)	D	128.0	259.0	279.6	Buffelsfontein (d)	J	197.0	1,661.0	1,694.0
P. Brand (c)	S	45.5	219.6	231.0	Ellaton (d)	D	0.5	5.0	34.0
P. Steyn (c)	S	62.0	30.6	303.7	Stillfontein (d)	D	19.5	97.5	185.0
Vaal Reefs (c)	D	67.5	150.4	288.4	W. Rand Cons. (a) (d)	D	166.7	353.2	423.5
Welkom (c)	S	59.0	290.8	288.8	Anglo Transvaal				
West Reefs Ex. (c)	D	46.5	101.1	325.2	Hartebeest. (d)	J	220.0	1,887.0	2,101.6
Central Mining					Lorraine (d)	S	35.0	169.0	181.0
Blyvoor (c)	J	147.5	1,253.5	1,235.4	N. Klerksdorp (d)	D	10.5	21.0	21.5
Harmony (c)	J	194.3	1,898.6	1,589.9	Virginia O.F.S. (d)	J	151.8	1,383.4	1,416.0

Tables include profit from uranium acid and pyrite before loan redemption. (a) Total profit from uranium section. (b) Overall profit. (c) includes royalty provision. (d) excludes royalty provision * Net revenue after provision for loan redemption.

LORAINÉ GOLD MINES, LIMITED

(Incorporated in the Union of South Africa)

INTENSIVE DEVELOPMENT PROGRAMME

MR. B. L. BERNSTEIN ON PROGRESS ACHIEVED

At the Annual General Meeting of the Loraine Gold Mines Limited, which was held in Johannesburg on March 9, Mr. B. L. Bernstein, the Chairman, said:

"In the annual report I gave shareholders a comprehensive review of the company's operations up to the end of December, 1960. Since then the discussions on the new arrangements for the sale of South Africa's uranium oxide have been completed and information regarding the effect of these new arrangements has been published in the Press. As far as your company is concerned, its quota, which formed part of that produced by the Orange Free State Joint Uranium Production Scheme has been transferred to other producers. The Joint Scheme will receive a royalty payable on a monthly basis and will continue to function for the purpose of distributing revenue and apportioning contributions towards the capital costs of the President Steyn and Welkom plants which will be placed on a caretaking basis. It is estimated that your company's share of the profit will amount to approximately £36,000 per month over the remaining five years of the contract. Contributions to the capital expenditure of the Joint Uranium plants will remain at an average of approximately £13,000 per month.

Development Results

I now propose to bring you up-to-date in regard to development results at your mine up to the end of February. During January and February, 1961, 14,618 feet of development was accomplished. Although 13,966 feet of this development was in the Elsburg section only 2,173 feet was on reef. Of 1,480 feet sampled on these reefs 975 feet equal to 65.9 per cent was payable at an average value of 30.51 dwt. per ton over a channel width of 29.5 inches equivalent to 900 inch-dwt. Development on the Elsburg reefs since the end of 1960 has been carried out mainly in the three separate areas shown on the plan on the wall. The main concentration of development is in the No 3 shaft area, where ventilation facilities are such that stoping tonnage can be made available rapidly. The second most important area of development starts from about 2,000 feet north of borehole TV2 and continues to the northern boundary of the old Riebeeck lease area. The third area is in the vicinity of borehole TV2 where a limited amount of development has been done.

I shall now deal with these results in more detail with reference to the specific areas which I have mentioned.

In the No 3 shaft area (area No. 1 on the plan) development is being carried out at an average rate of 6,200 feet per month and it is intended to maintain this high rate of development until an adequate ore reserve has been established. Most of the development has been in country rock, but with the completion of the crosscuts from the shaft on each level, the footage on reef will increase. Since the end of 1960 reef development from the 52nd and 54th levels has been in progress on two reefs one in the lower zone and one in the middle zone.

595 feet have been sampled and have disclosed payability of 53.8 per cent having a value of 27.99 dwt. per ton over a channel width of 28.3 inches, equivalent to 792 inch-dwt. In addition a limited amount of work has been done on the "A" and "B" reefs which are stratigraphically below the Elsburg reefs. On the "A" reef two crosscuts have intersected payable values averaging 17.0 dwt. per ton over a channel width of 24.5 inches equivalent to 452 inch-dwt. On the "B" reef 50 feet were sampled of which 45 feet equal to 90 per cent was payable at an average value of 7.41 dwt. per ton over a channel width of 27 inches equivalent to 200 inch-dwt. Development on the upper Elsburg reefs is about to commence from the 48th level.

In the area north of borehole TV2 (area No. 2 on the plan) reef development is being carried out between the 52nd and 50th levels on five reefs of the upper zone. Since the end of 1960, 845 feet have been sampled, of which 72.8 per cent was payable at an average value of 32.42 dwt. per ton over a channel width of 30.6 inches equivalent to 992 inch-dwt.

In addition 40 feet of development has been sampled on a reef in the lower Elsburg reefs zone all of which was payable at an average value of 15.9 dwt. per ton over a channel width of 22 inches equivalent to 350 inch-dwt.

In the vicinity of borehole TV2 (area No. 3 on the plan) a further small amount of development has been done during this quarter on the reef in the lower zone to which I made reference in my speech last year. One hundred and thirty feet were sampled all of which was payable at an average value of 41.3 dwt. per ton over a channel width of 23.3 inches equivalent to 963 inch-dwt. In order to stop this reef together with other reefs north of TV2 above the 52nd level, the 50th level is being established off a service winze from the old Loraine 48th level. As this haulage has some 3,000 feet to advance before a holing can be effected with the development in the vicinity of borehole TV2, it will be some time before stoping can commence in this area. It will be noticed that uranium values have been omitted in the results of sampling I have given you. With the sale of the right to produce Loraine's uranium quota, assaying for uranium values has been discontinued, but the slime from the gold plant will continue to be assayed for its uranium content.

When sufficient stope faces on the Elsburg reefs have been established between No. 3 and No. 2 shafts, a haulage on the 48th level will be started to prospect the Elsburg reefs south of No. 3 shaft where surface boreholes disclosed good values in several boreholes stretching from borehole VDH1 about 1,500 feet south-west of No. 3 shaft to borehole ERK1 on the southern boundary of the property.

There has been much speculation regarding the total tonnage of payable Elsburg reefs contained in the mine. Work done to date has proved that the

upper and lower Elsburg zones are continuous from the Northern boundary of the old Riebeeck lease area to No. 3 shaft, but until the number of Reefs and the extent of their payability on dip is known, it is impossible to make any such assessment. To prove the extent of payable values on dip, a considerable amount of work will have to be done on and below the 56th level where underground drilling has indicated that reefs exist over a considerable area between No. 2 and No. 3 shafts. To date, development has been carried out on eight separate reefs in the Elsburg series and it is possible that there may be more reefs of economic interest. Shareholders must appreciate that any consideration of an increase in the milling capacity must await the results of the more intensive development to which I have referred.

The percentage of Elsburg ore sent to the mill is being increased as rapidly as possible and is having a marked effect on the recovery grade, which in February increased to 5.1 dwt. per ton milled. Stopping is about to commence in the No. 3 shaft area. Due to the decline in values of ore drawn from the basal reef in the No. 1 shaft area, stoping on this reef is being steadily reduced and is expected to cease by June 1961. At that stage No. 1 shaft will be shut down to reduce overhead costs.

Working Costs

During the 1960 financial year working costs increased by 3s. 4d. per ton milled. This change resulted mainly from additional stoping and underground transport costs of ore from the Elsburg reefs. Since the end of the financial year there has been a further increase in working costs due to the change over of No. 3 shaft from a sinking to a working basis.

Milling of ore hoisted up No. 3 shaft commenced on February 28, 1961, and Anglo American Corporation of South Africa Limited have been notified that interest at 6½ per cent per annum on their loan to the company of £3,594,677 will be paid with effect from March 1, 1962.

Shareholders will observe that the simplified model showing the geological structure between No. 2 and No. 3 shafts which was on view last year is again available and those shareholders who are interested are invited to inspect the model after the meeting. The company's technical staff will be available to explain it. At the same time our technical staff will be available to assist those shareholders who wish to study the plan of the underground workings."

In reply to shareholders' questions, the Chairman stated.

"The present ventilation facilities in the Elsburg sections enables the company to mine approximately 150,000 tons per month, or supply to the mill approximately 115,000 tons of ore per month. More development will be necessary to ensure that sufficient tonnage is available to justify an increase in the mill capacity. By up-grading the ore fed into the mill by means of electronic sorting (which is at present being investigated) a higher yield may be achieved with our present plant. It should also be appreciated that an increase in the tonnage milled may accelerate the date when a further shaft is required between No. 3 shaft and the southern boundary

of the lease area. It is not possible at this stage to give a forecast of the date when the extent of payable reef on dip will be known."

The Chairman also stated in reply to a question that, "though the company has had a value of approximately 20,000 inch-dwt., this should not be used in making an assessment of the mine as negligible values are also found in close proximity to such values."

The motion for the adoption of the directors' report and accounts was seconded by Mr. Jack Scott and was carried unanimously.

The retiring directors, Sir George Albu, Messrs. B. E. Hersov, C. S. McLean and S. G. Mennell were re-elected, the Auditors' remuneration was fixed and payment of their expenses was confirmed.

GEOLOGISTS: DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

At least 4 pensionable posts in Geological Survey for men and women aged 21 and under 30 (31 for permanent members of Experimental Officer Class) on 1.7.61; extension for candidates with regular Forces service or Overseas Civil Service. Qualifications: normally 1st or 2nd class honours degree in Geology. National salary scale £738-£1,222. Starting pay may be above minimum. Promotion prospects. Write Civil Service Commission, 17 North Audley Street, London, W.1, for application form, quoting S/168/61. Closing date April 19, 1961.

Company News

Matbro Ltd. is forming a new earth-moving division, and an extension is being built to house this division at the Horley works, which should be completed by mid-April.

Exhibitions, in Leeds, Birmingham and London will be held in March, April and May respectively, to show surveying and other specialized optical instruments, by the Pyser-Brite Group which incorporates the Surveys and General Instrument Co. Among companies exhibiting instruments will be Hilger and Watts, and Cooke Troughton and Simms, and the new Kern GK-23 precision level and Kern DK-RV vertical rod self-reducing tachometer will be shown for the first time in the U.K.

British Insulated Callender's Cables announce that, on March 13, their Ipswich branch moved to 1 Benezet Street, Ipswich, Tel. Ipswich 57265. Their previous office in St. Peter's Street has been closed. The new branch which has larger accommodation, will continue under the management of Mr. L. de Wynter.

The Thyssen Shaft Sinking Co., broke all previous British shaft sinking records the N.C.B.'s Kellingley Colliery project. During January, 1961, 338.97 ft. of a 24 ft. dia. shaft was completed, more than 7,000 cu. yds. of solid rock being excavated. Three shifts were employed,

and 73 holes, varying between 8 ft. and 10 ft. in depth were drilled per round, the average drilling time per round being 1½ hours. Throughout Holman Silver 3 handrills were used, which were specially converted to allow for high volume independent blowing to overcome the difficulty in withdrawing the drill steels from "frozen ground".

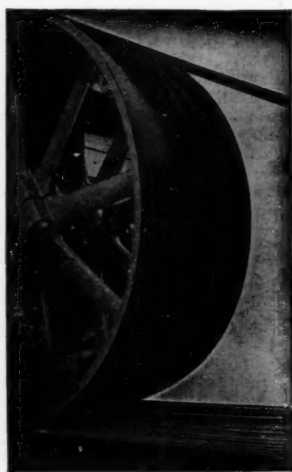
Mitsubishi Nippon Heavy Industries (Yokohama) Ltd. is building a refrigerated L.P.G. tanker for the Bridgestone Liquefied Petroleum Gas Co., of Tokyo. The tanker will have a capacity of 180,000 barrels, equivalent to about 17,000 tons of refrigerated L.P.G. at approximately -40 deg. F., and a speed of 16 knots. The ship has been designed by Conch International Methane Ltd., who built the world's first liquid methane carrier "Methane Pioneer", which made seven deliveries of methane from U.S. Gulf Coast to Canvey Island. Conch International Methane Ltd. is partly owned by Canadian Shell (a company of the Royal Dutch/Shell Group).

C. H. Johnson (Machinery) Ltd. announce the conclusion of a co-operation agreement with J. Wormser A. G. of Zurich and Spanner Baumaschinen G.m.b.H. of Frankfurt for the development of common products of each of these companies in the European Common Market areas and the E.F.T.A. areas.

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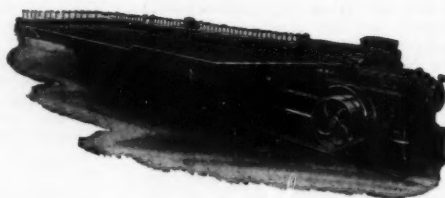
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M.T.D. (MANGULA) LTD.

(Incorporated in Southern Rhodesia)

OPERATING COST AGAIN REDUCED**GREATER POTENTIAL DEMAND FOR COPPER****COMMANDER H. F. P. GRENFELL'S CONFIDENT VIEW
OF COMPANY'S FUTURE**

The Fourteenth Annual General Meeting of stockholders of M.T.D. (Mangula) Limited was held on March 9 in Salisbury, Southern Rhodesia. **Commander H. F. P. Grenfell, D.S.C., R.N. (Ret'd.)** (the Chairman), who presided, said:

Ladies and Gentlemen, it gives me great pleasure to welcome you once again to the Annual General Meeting of your Company, and on behalf of the Board of Directors to present for your approval their Report, and the Audited Accounts of your Company for the financial year ended September 30, 1960. I propose with your permission to take these as read.

Sensitivity of Copper Market

Since our last meeting the copper market has once again proved itself sensitive not only to unrest within the industry, but also to extraneous factors elsewhere such as the situation in the Congo and the low level of business activity in the United States. Apart from these influences the potentially greater productive capacity of the industry which has been building up for the past two years, became increasingly apparent during the period we are reviewing, and resulted in an overall downward trend in prices during the latter part of our financial year.

This trend was continued well into the current year, and it now remains to be seen whether the recent cuts in production announced by a number of the major producers will be effective in restoring stability at higher levels. The potential surplus of production to which I have referred still hangs over the market, and it would seem that much depends in the near term on the extent of recovery in consumption in the United States. If this proves to be substantial the situation would be materially altered, particularly if, as seems possible, there should be fresh labour troubles within the industry itself.

Looking further ahead I have no doubt, for the reasons I gave you at our last meeting, that the consumption of copper will continue to rise year by year in line with higher standards of living not yet enjoyed by a majority of the world's population. Failing the discovery of large new deposits, the potential purchasing power of these people, added to the normal annual increase in consumption, may well result in a demand for copper which the industry will find difficult to meet. With these thoughts in mind I continue to hold a confident view of the future of your Company.

The Year's Operations

Turning now to the year's operations you will recall that the milling plant was finally completed in July 1959. This financial year was therefore the first complete period of twelve months at full production, and it resulted in an output of 25,923 short tons of concentrates containing 11,515 long tons of copper.

Before commenting on the operating results however, I would like to refer briefly to some of the more important financial aspects. Your Company's net profit for the year was £923,485; dividends numbers 3 and 4, totalling 15%, absorbed £750,000; and a sum of £150,000 was placed to Reserve. The unappropriated profit of £20,403 has been carried forward to next year.

Full details of the operating results are given in the Report by the Consulting Engineers, a summary of which is included with the Accounts, and today I only propose to draw your attention to the main features of the year's work.

On the whole the Aerofall Mills operated satisfactorily throughout the year, and the actual running time at 88% of possible time was better. I look for a further improvement this year.

The Flotation Plant also operated satisfactorily, and as you have already heard, produced 25,923 short tons of concentrates, the bulk of which were shipped overseas for final treatment. Since December however, Mangula concentrates have been sent to the new plant at Alaska operated by The Messina Rhodesia Smelting and Refining Company Limited in which your Company holds a 20% interest.

It had been hoped that the Smelter would begin operating about two months earlier, but various unforeseen delays occurred, and in the event it was not until December that it was ready to receive our concentrates. Copper produced by the Smelter will be registered under the brand M.R.S.R. and present indications are that it is of excellent quality.

Due partly to the delays to which I have referred and partly to increased costs incurred by improvements to design during the construction period, the original estimates were exceeded by approximately £275,000. Arrangements have been made for the additional funds required to be provided by way of loans from the parent Company and ourselves.

As I forecast in my speech last year, operating costs, at 20/5 per short ton of ore treated, were again reduced, the figures for the previous year being 25/3.

The productivity per employee, both European and African showed an outstanding improvement as can be seen from the table given on page fifteen of the Report. The tonnage hoisted per employee at work was about 40% higher in each category. The increased scale of operations was of course responsible for much of this improvement, and also for the reduction in costs which I have already mentioned, but nevertheless these results would not have been achieved without efficient management backed up by the co-operation of our employees, and they deserve our congratulations and thanks.

**Development Work Increases
Ore Reserves**

As a result of development work carried out underground during the year,

the Ore Reserves in the Molly Section showed a slight increase in spite of the greater tonnage hoisted from the mine. I am hopeful that the current development programme may result in a further increase.

I mentioned in my speech last year that the continuation of underground exploration would enable us to build up a more accurate picture of the geology of the area, with particular reference to the boundaries of the orebodies; and that our geologists were already considering a modification of their original concept as to their position and shapes.

Work carried out during the year supports their new line of thought, and it is now believed that the central part of the mine consists mainly of foldings of one and the same orebody, which in the upper levels has considerable width and is more intensely mineralized.

Towards the North and South, the orebody seems to split into two roughly conformable layers, the upper one forming the valuable West Orebody, and the lower one incorporating parts of what have been referred to as the East, Middle and Far East Orebodies. Three deep boreholes sunk during the year; established the continuation of these ore layers to a depth of 1,750 feet below surface.

The Molly Section is also overlain by some two million tons of mixed oxide and sulphide ore, and plans are almost complete for the removal of this capping to facilitate mining the pillars which remain on the upper levels of the sulphide orebody below. Investigations are being carried out to determine whether the Molly ore capping, and other similar orebodies on the property, can be profitably treated.

In the Norah area the Brian Shaft section has recently been brought into production on a limited scale. As stoep preparation advances output will gradually be increased and should reach 400 tons per day during the next nine months.

Meanwhile, development is continuing from the Harry Shaft and ore of good grade has been disclosed. Further exploration by diamond drilling is about to begin and I am hopeful we shall also get a useful addition to our Ore Reserves from this section.

At Silverside the old South Shaft has been reopened and the 140 feet level made accessible. As stated in the Consulting Engineers' Report re-sampling has indicated the existence of 300,000 tons of mainly oxide ore averaging 2.18% Copper above this horizon. Further development work is in hand.

In addition to the work I have just mentioned our geologists are actively engaged in the exploration of various other parts of the property and I will continue to keep you informed of any discoveries of importance they may make.

This concludes my remarks on the technical side of our operations, but before closing I would like to refer briefly to one or two other items of general interest.

In March, 1960, Their Excellencies The Governor General and Lady Dalhousie honoured us by paying an official visit to Mangula, and on leaving expressed themselves well pleased with what they had seen.

European and African Staff Welfare

In August, 1960, the new European Recreation Club was officially opened by

the Honourable C. J. Hatty, M.P., Minister of the Treasury and Mines, and its amenities are greatly appreciated by our employees. As soon as the rainy season is over, the work of laying out the grounds surrounding the Club will be put in hand, and when completed, Mangula will have a Recreation Centre as attractive as any in the country.

As far as our African Employees are concerned we are about to begin the building of a new and greatly enlarged Welfare Centre; the Swimming Bath has been finished and is in constant use; work is well advanced on the Sports Ground which will include running and cycle tracks; and a general programme of landscaping the Compound area is in hand.

We have already found it necessary to build additional classrooms at the African School, which is now attended by nearly 700 pupils, and we have recently established a Nursery School which is very popular. We have also adopted the policy of providing superior houses for certain of our senior African employees, and this gesture has been very much appreciated.

Of course all these things cost money, but I am sure you will agree that it is money well spent, if, as I believe, it results in a happy and contented community.

Changes in Legislation

During the year there have been a number of changes in legislation affecting the mining industry, and a new Mines and Minerals Act has already had its second reading in the Southern Rhodesia Parliament and has been considered by a Select Committee. In particular the Act represents a sincere attempt to reconcile the conflicting interests of the miner and the farmer.

On the one hand it is obviously unacceptable that the farmer should suffer undue insecurity or loss of productivity due to mining activities on his land, while conversely there should be no unreasonable obstruction to the exploitation of the country's mineral wealth. It would no doubt be overstating the case to say that the New Act is entirely acceptable to both parties, but the large measure of agreement that has been reached has only been brought about as a result of the closest co-operation between the Colony's two major industries.

Also of considerable importance in the new Industrial Conciliation Act, which specifically provides for the establishment of multi-racial Trades Unions.

This brings me to the end of my review, and on behalf of the Board, I wish to take the opportunity of thanking Mr. Wilson, our Resident Manager, and all our staff and employees for their continued loyal support and good work during the year. I feel sure that you also would like to be associated with this expression of thanks.

The Directors' Report and Accounts for the year ended September 30, 1960, were adopted.

The retiring directors, Mr. P. U. Rissik and Mr. C. M. Stuart, were re-elected. Messrs. Geo. MacKenzie & Co. were re-elected auditors for the current year and their remuneration for the past audit was confirmed.

There being no further business, the Chairman declared the proceedings at an end.

NATIONAL AND GRINDLAYS BANK

SUCCESS OF ARRANGEMENT WITH LLOYDS BANK

The Annual General Meeting of National and Grindlays Bank Limited will be held on April 11 in London.

The following is an extract from the circulated statement by the Chairman, Mr J. K. Michie:—

The principal event in our record of 1960 is not reflected in the balance sheet—the acquisition by us of the Eastern business and branches of Lloyds Bank Ltd. and as a part of that bargain the acquisition by Lloyds Bank Ltd. of just under 25% of our capital. This mutually agreeable arrangement was ratified by you at an Extraordinary General Meeting held on November 15, 1960. As you will see it has added 19 to our list of branches and as will emerge it means an increase of around £50,000,000 in the total of our next balance sheet.

Another concomitant effect was the strengthening of our Board by the addition on January 1 of Sir Jeremy Raisman and Lord Lloyd, appointments which fall to be confirmed at the Annual General Meeting. Sir Jeremy is Deputy Chairman of Lloyds Bank and both are distinguished names in the realm of Commonwealth affairs. At the same time Mr. C. Gardner, Chief Manager of Lloyds Bank Eastern Department joined our executive staff as an Assistant General Manager and Mr. R. J. S. Marsh as Assistant Manager.

A great deal of time and thought was given to preparation for this merger of interests and your General Manager, Mr. Gillespie, and I have just returned from tours much of which we did in concert though his was the more comprehensive and strenuous. Our visits covered the principal branches of the combined Bank in India, Pakistan and Aden. In addition Mr. Gillespie visited Ceylon.

Added Strength Assured

Our journeys although covering a wider field were undertaken with the particular object of seeing that in every possible respect the merger should get off to a good start and that there should be no misunderstandings about our future policy in the minds of either our constituents or our staff.

I am glad to report that our impressions were without exception favourable. Our combined staffs have from the outset shown a most admirable team spirit while our constituents appreciate that the merger means additional strength to the Bank. There is too a realization in India and Pakistan that banking should be inherently as strong as possible and this was reflected in expressions of approval of the merger made to us by many individuals including members of the banking fraternity.

Growth of Advances

The total of our consolidated balance sheet at December 31, 1960 was £181,551,921—an increase of £18,516,333 over the previous year. The growing demand for finance in the territories in which we operate, has resulted in an increase in advances of just under £19,000,000. Current, Deposit and other accounts are over £18,000,000 higher, but this pressure of demand for seasonal finance has had the effect of reducing our liquidity ratio.

At £479,276 our net profit was £74,568

higher reflecting the overall more favourable conditions for banking which obtained in our territories in 1960 in comparison with the previous year—which in turn showed an improvement over 1958.

Subject to necessary reservations in respect of East and Central Africa and Burma this better climate for banking generally seems likely to continue and as a consequence of this view we have increased our second interim dividend for 1960 from 6½% to 7% making the total distribution for the year 13½ per cent. Further this action would not have been taken unless we had felt justified in promising to consolidate this rate of dividend—you can therefore expect subject to no unpredictable contingency to receive 14 per cent on the increased capital for the current year.

National and Grindlays Finance and Development Corporation—The net profit for the year was £10,152 the reduction being accounted for by the higher rates of interest paid on its borrowings from the Bank.

Confidence in the Future

While it is apparent that all is by no means plain sailing it is also true to say that your Board and Management do not take a pessimistic view of our future, otherwise we should neither have increased our dividend nor have increased the number of our branches and sub-branches from 94 to the present total of 141 in a period of just over a year. We continue to believe that whatever the political future, sound banking is a necessity to economic life, and it is that which we aim to provide. Indeed I agree with those who argue that sound economics backed by a stable banking system is a necessary background to any country and any Government and should have a high priority.

What continues to puzzle me in regard to this country and I am sure causes concern in many minds, is our apparent inability to achieve a worthwhile favourable balance of trade in spite of what is to all intents and purposes full employment. It is all very well to argue that the British people prefer "the good life" to a higher level of savings but in the world of today the problem by no means ends there. We must either have more money to invest abroad, to lend to our Commonwealth friends and particularly to emerging nations, or see our influence and our trade with them steadily wane.

We incline to claim that we are a special repository of wisdom on international affairs and that others have always been glad to have our counsel but I feel that would be a more valid argument were we to prove ourselves more successful and more able to help them financially. There is much in the Russian claim that the cold war is now becoming an economic one.

Finally, our Staff—and that includes those we have recently absorbed—have given and are giving us enthusiastic and loyal service and that applies from our General Manager right down the line.

When Mr. Gillespie and I were recently on tour we took occasion to meet as many of the staff as was possible and I hope that the friendly exchanges we had—*inter alia* with our Union Officials—will bear good fruit.

